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The Book of the Month for March is

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The forest and woodland have much to teach us in such basic aspects of gardening as maintaining the soil in a living condition, mixed plantings, the interrelationships of plants which occupy a common environment, and a balanced relationship between plants and animals. This book deals with the most vital but little-understood relationship between the lowly toadstools which grow in the forest floor and the giant trees which tower high over the other woodland plants. This partnership is of fundamental importance in the nutrition of many of our woodland trees. 122 pp., 18 photographs. **$2.50.**

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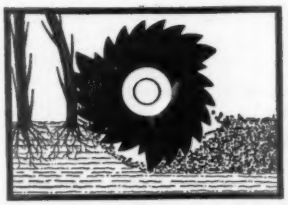

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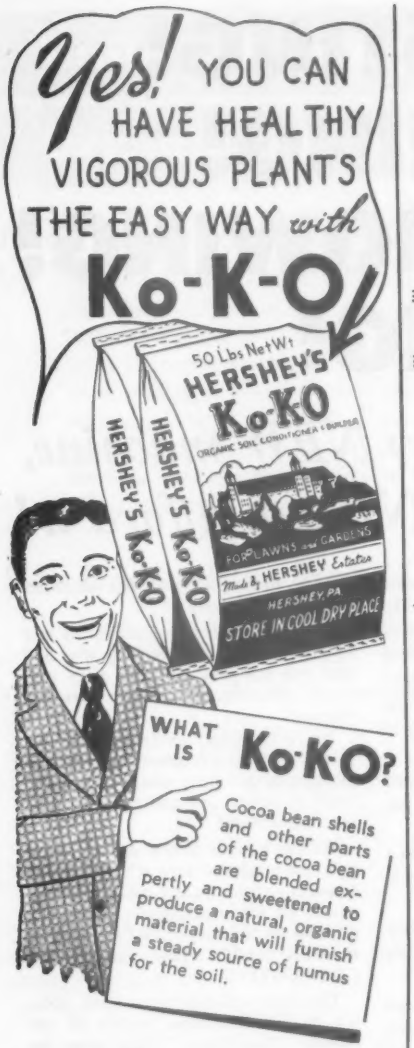
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Organic Gardening

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NATURAL FERTILIZERS THE BEST

We are not engaged in canning at present as our letterhead would indicate, but are operating greenhouses and are producing tomatoes for the wholesale trade. We raise two crops a year under glass, a fall crop and a spring crop.

Up until about three years ago, our hothouse tomatoes produced very heavily and were considered the finest on the Chicago market. We were using small amounts of commercial fertilizers as a supplementary feeding for our plants in addition to a four inch mulch of strawy horse manure which was applied just before setting out the seedlings.

Three years ago we embarked on a high fertility level program, guided by our own soils, furnishing and maintaining an adequate, available supply and also a reserve supply to the soil. Result: our production has steadily declined and when our plants got about five or six feet tall they became infected with tobacco mosaic, which was diagnosed by a pathologist from the University of Illinois. I believe the use of commercial fertilizers coupled with our steam-sterilizing practice has resulted in a weakening of the plant resistance to fungus disease. I have changed the seed to Livingston Globe W-R (wilt resistant) from Livingston Globe Extra Select, which by the way is the most expensive seed I have found ($50.00 per lb.), but this, I think, is not the answer to our problem.

I believe composting cattle manure and other vegetable matter that may be available and working these

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materials into the soil, with perhaps a rotation to cucumbers for a crop or two, will do more to eradicate the tobacco mosaic than anything else we could do.

We have been raising tomatoes for over 20 years and are still learning the hard way. Trying to beat nature's processes is like trying to raise yourself by your boot-straps.

A Subscriber

Pesticides and Foods

•

HEARINGS are now being held in Washington, D. C. under the auspices of the Federal Food and Drug Administration on the effects of poisonous sprays on the public health. Organic Gardening has been promised a place on the schedule of the hearings to make contributions on this subject. The Editorial Staff invite readers of this magazine to send to us, for use in these hearings, any information and data you may have on the successful growing of fruits, vegetables, and other foods without the use of poison sprays. It is our hope that all orchardists who are now growing fruits without poisonous sprays will give to us a full report of their practices and results. We shall appreciate early replies so that they may be studied and prepared for presentation at the hearings in Washington.

DO RASPBERRIES "RUN OUT"?

Do raspberries "run out"?

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and throwing them on a pile, so I stopped and went in to ask him if I could have them. He said I could have them and that would save him the trouble of burning them, but they would do me no good as they were all run out and what few berries they bore were very small, mostly seeds.

I took them home and planted them along one side of the garden which was new land. It was only yellow clay as the wind always blew the leaves off this higher land, and there was no bush to hold them. I had hauled leaves, grass, strawy manure, including some chicken manure, and plowed it under so I thought the raspberries would do well in such soil. I had a tall stake for each plant and left five and six stalks for each plant. They grew very fast and the next year, and for many years, I had plenty of fine raspberries. I mulched them every summer with very strawy manure.

One day the neighbor from whom I got the plants stopped in and wanted to know where I got the fine raspberries as he wanted to get some of the very same kind. When I told him they were his old run out plants he was going to burn, he had a hard time to believe it. Many people stopped to ask where I got such fine raspberry plants. I must say that they never got any superphosphate, etc.

As Mr. Wickenden says in, "The Novice and his Thumbs," in May *Organic Gardening*, "80% of success in gardening depends on the soil." I will add that it takes just a little common sense too.

Charles Faber
3243 Girard Ave. N.
Minneapolis 12, Minn.

—o—

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(*Continued on page* 10)

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You are right in step with organic gardening principles if you have a MOW-MASTER. Besides doing a wonderful job of mowing, MOW-MASTER helps build up your soil the organic way. It thoroughly pulverizes grass and weed clippings or autumn leaves and returns them to the soil as mulch and humus. It eliminates raking, hauling or burning of cut grass and weeds or autumn leaves and keeps yard neat and clean. The amazing New Grind-a-Leaf attachment converts MOW-MASTER into leaf pulverizer, quickly, easily.

The 1950 MOW-MASTER IS NEW! It is improved! It has many new features —lighter than ever, yet built for many years of service. Powered by 2 H.P. smooth-running POWER-PAK Engine. Cuts 21 inch swath. Adjustable cutting height. Easy to run. Economical to operate. See this remarkable mower at your dealer's.

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CUTS TALL GRASS AND WEEDS

PULVERIZES LEAVES. ABOLISHES RAKING, HAULING, BURNING

FREE booklet "POINTERS ON MAKING GOOD LAWNS" and our MOW-MASTER Literature sent upon request.

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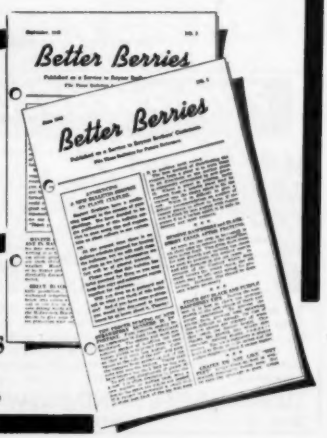

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OUTFIT F. O. B. Cleveland $16
100 tests each for Nitrates, Potassium, Ammonium, Phosphorus, Acidity, plus tissue tests for Nitrates, Phosphorus and Potassium, with full directions and charts. Other Simplex Soil Test Outfits at $25 and $36. All F.O.B. Cleveland.
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MAKES GARDENING EASY!
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Thousands of satisfied users
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No more hard spading! You too can have fine gardens, with less time, less effort (do 10 hrs. work in 1). "TUG-O-WHEEL" does it—all steel outfit plows 9" deep; marks rows 12" to 36" wide; hills, cultivates, destroys weeds; fast, quick, easy; quality fully guaranteed. Free folder tells all. Write
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Dept. O Ballston Spa, New York

What's New AT HOME AND IN THE GARDEN

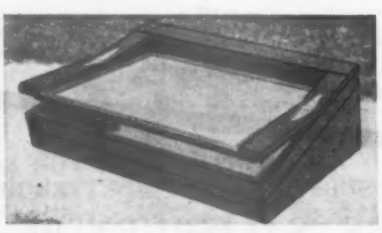
Precipitron

The new household Precipitron the long-awaited electrostatic air cleaner that promises to eliminate daily dusting drudgery. Developed by research engineers of the Westinghouse Electric Corporation. The device removes 85 to 90 per cent of all dust in the circulating air stream in homes as large as eight rooms. Westinghouse Electric Corporation, 40 Wall St., New York 5, New York.

—o—

Hot Beds and Coldframes

A specially designed balanced sash reduces drafts and permits fully automatic control of ventilation, with a small gas filled thermostat. Automatic electric heat optional. Construction plans for building the hotbed or adapting it to frames already in use available for one dollar. Weather Watcher, 4228 Highland Ave., Downers Grove, Ill.



Organic Soil Conditioner

Although Espoma has been on the market for some time, it is interesting to observe the method of making this organic soil conditioner. Espoma is manufactured by processing King Crabs found in the Delaware Bay during the months of May and June. The crabs are passed through a large crusher which breaks them into small pieces about the size of a quarter, then discharged into a rotary kiln dryer. From the dryer they are run into a hammer mill which grinds them to desirable fineness, after which they are bagged and stored until needed. Both male and female King Crabs are processed, but the female is more abundant in plant food because of the thousands of eggs contained in them. King Crab, to our knowledge, is the highest nitrogenous organic available with an analysis of better than 10% nitrogen. Besides nitrogen, King Crabs supply iodine and other trace elements. The Espoma Company, Millville, N. J.

—o—

Leaf Mold

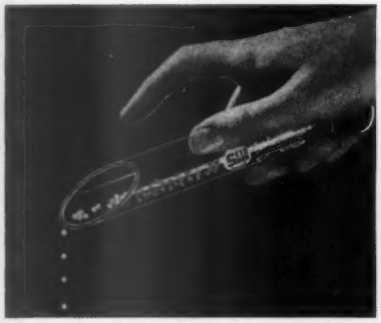
Leaf mold will soon be made available to city organic gardeners in one and two pound lots. Plans are underway in Philadelphia to package leaf mold for national distribution.

This 100% organic odorless plant food is a pure leaf mold humus. It may be used freely on all indoor and outdoor plants, and is especially good for potted plants. A limited quantity is available at the present for those who want to try it out. The packages sell 1 lb. for $.35 and 2 lb. for $.50, both postpaid. The Pure Compost Co., 6318 N. Tarbor Ave., Philadelphia 11, Pa.

Plastic Seed-Soer

"From Peas to Petunias" describes the wide range of seeds the Seed-Soer will handle efficiently. The seed-soer itself is made of a transparent green plastic tube one inch in diameter and 6½ inches long. The rubber cork pivots in the palm of the hand. The device is tapped either vertically or horizontally. The seeds are visible as they come bouncing out.

By using a plastic with a density of less than 2, and tapping lightly, the seeds bounce and distribute themselves uniformly. Gro-Quick, 361 W. Huron, Chicago 10, Ill.



—o—

Portable Sprinkler System

Common sense was all that was needed to develop the novel SPRINKLIT. This watering device consists of a garden hose with 5 solid brass sprayers attached at intervals along the hose. Each sprayer has an individual on and off control that directs a low, gentle fine spray to cover one to 1,000 square feet. Fifty feet long and weighing only eight pounds, this practical device may be obtained from Howard Sales Co., 1650 Belmont Ave., New Hyde Park, New York.

Power Lawn Mower

The redesigned "Philadephia Super Falcon 21" Power Mower is among the improved lawn mowers available this year. A new steel handle has replaced last year's hard wood handle. Simplified clutch and throttle control attachments are securely mounted on the new handle. The old style shrub bar has been eliminated and bed plate redesigned with two separate openings to provide adjustment of cutting height from ½" to 2½". Other new features have been added to improve cutting ease. Coldwell-Philadelphia Lawn Mower Co., Newburgh, New York.

—o—

New Rotary Tiller

Front mounted, quick coupling, powered tools is the outstanding feature of the new Ariens "Gardeneer". It is front mounted for accuracy, visibility and control, and is available with such tools as rotary tiller, lawn mower, rotary snow plow, bulldozer, sickle bar, seeder and furrower. It has 2½ HP 4 Cycle Engine, 3 forward speeds, semi-automatic free wheeling, pneumatic tires 3.50 x 7 with an overall wheel width of 10" for narrow work. Ariens Company, Brillion, Wisc.

THE
1950
HANDY-TRAK
only
$135

Power!
Balance!
Pivot turns!
Traction!

A Combination Of
Quality And Economy!

The only small one wheel tractor that will plow efficiently! The accessories for this versatile, 142 lb. tractor include plow, harrow, cultivator, riding sulky, lawn mower adapter, etc., all of which are attached quickly with a drop pin. For descriptive literature, write:

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Orlyt GREENHOUSE
$425

Flowers all winter, seedlings by the thousand to set out in the Spring. It is easy with Orlyt. Comes in sections that go together with bolts and screws. Simple to put up anywhere, any time. $425 buys 10 by 11 ft. Orlyt pictured ready to go on your foundation. Other Orlyts and Lean-tos from $190. Automatic heat and ventilation at reasonable prices. Convenient terms available. Ask for booklet No. 27.
See it at the Spring Flower Shows

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Kill Moles
WITH A
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The safe, sure way. Can't poison soil. Saves your earthworms. Used by all informed mole control specialists. At dealers, or direct, $2.50 postpaid, C.O.D. fees extra. FREE—Mole control pamphlet. Nash Mole Traps, 164 E. South, Kalamazoo, Michigan.

NASH Choker Loop TRAPS

East Penna. ROTO-ETTE REG. U.S. PAT. OFF. & N. J. Distr.

COMPOST in your own soil with Roto-Ette, Model "T" equipped with the new Rotemiller. See the ad on page one, then contact us if you live in the vicinity of the counties listed below.

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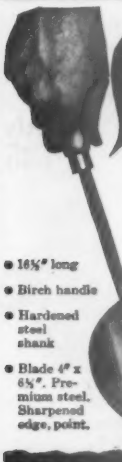
Stowe, Pa.
(Berks, Chester & Montgomery counties)

MOHR BROS.
Hatboro, Pa.
(Montgomery, Bucks, Philadelphia, & Mercer, N. J. counties)

"PERFECT" say gardeners . . . SPROWEL



Gardeners everywhere have written to praise SPROWEL and to reorder for friends. This handy garden tool combines the *working power* of the spade with the *convenience* of the trowel. The utmost in *Strength, Convenience,* and *Utility.* Thousands in use. Why don't you try one? Write to—

- 16¾" long
- Birch handle
- Hardened steel shank
- Blade 4" x 6½". Premium steel. Sharpened edge, point.

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$1.95 POSTPAID — MONEY-BACK GUARANTEE — REMIT WITH ORDER

COMPOST AS YOU WANT IT

- . . SCREENED
- . . SHREDDED
- . . GROUND
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(PATENTED) Rocks, trash separated. Grinds manure and tough organic matter through rolling screens, wet or dry. Screens fine as wanted through perforated screens. Free compost circular.

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FRONT MOUNTED

Precision built. . . front mounted for accuracy, visibility, and control. . .3½ HP 4 cycle engine — three forward speeds, semi-automatic free wheeling. Rotary tiller is adjustable 10" to 16". Additional tools available.

Write today for complete free details.

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The 1950 Weather Watcher Hotbeds and Coldframes

You need this inexpensive, automatic ventilation (and heat) to grow healthy seedlings. You can now build the sash to fit most hotbeds, even while in use. Don't worry about your frame while away from home. The self powered Weather Watcher thermostat will open or close your sash when it should.

Send for the original hotbed plans, the new supplemental drawings, and description of the new 1950 model. Only 20 cents.

The VENTILATION THERMOSTAT and new hotbed and sash construction plans, ONLY $4.50 PREPAID.

H. R. RAWSON, 4228 Highland Ave. Downers Grove, Ill.

Clean Chimneys Permanently

Stops down draft—prevents furnace explosions. Satisfaction guaranteed. This copper pot (with character) Mailable. For free booklet address

WIG., ABINGTON, MASS.

SAVES FUEL

FORUM

(*Continued from page 6*)

trees with leaves. This fall we added phosphate rock and a sprinkling of lime. We are beginning to see the results of our labours (for it certainly takes the time and energy). The quality especially was much better this year and there is a marked difference between those trees that have been mulched and those trees that haven't been. Our orchard has not been sprayed, nor have commercial fertilizers been added as far as I know, so we think it will respond more quickly to the organic way of gardening.

We are glad to see the difference in the plum tree that had been mulched. The Black Knot, which as you know is so common among plum trees, has almost disappeared. Quite often the only remedy is to use the tree for firewood.

This is but one of the many ways we have been rewarded by following the organic way of gardening.

Miss Lois Heddon

Columbus, Ontario, Canada

—o—

METHODS OF COLLECTING AND STORING LEAVES

I am writing you these lines to describe a method of handling fallen leaves that I have found useful. Perhaps your readers would be interested.

I have long wanted to use the tremendous numbers of leaves that gather along the curbs and city streets near my house. But handling the leaves in a bushel basket or box was too slow and time-consuming, so I got hold of a large piece of cloth, about four feet by six feet. In use, I lay the cloth on the ground, near the leaves, holding it down with a few stones, if the day is windy. Then with a broom, rake, or any handy implement, I throw the leaves into a pile in the middle of the cloth. When I have enough, I grasp the

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8 to 12 in. plants, well branched. Rich bronzy-red through summer; scarlet berries fall and winter. 10 plants $3.00 postpaid

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1-yr. plants, 10 to 12 in.
5 plants $3.00 postpaid
Bloom young. Produce large trusses of beautiful blossoms. In assorted colors.

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WILD BROS. NURSERY CO.
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"In the Beautiful Ozarks"
OUR 76th YEAR

NEW MINNESOTA HYBRID VEGETABLES

ENORMOUS YIELDS, DISEASE RESISTANT, HYBRID VIGOR

CUCUMBER Prolific early producer. Vigorous, disease-resistant. Amazing yielder of firm, crisp, med. size fruit, just right for slicing or for pickling.

TOMATO Giant plants yield up to 1½ bus. each. Amazing vigor. Bears continuously from MID-JULY 'til killing frost! Strong blight resistance.

MUSKMELON Surprise mixture of Hybrid varieties. All fine quality. Plant one packet, harvest many sizes, types and flavors of delicious melons.

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AA Grade 2 yr. field grown plants. A special offer to present our fine stock of CAMELLIAS, ROSES and AZALEAS. Order 1 or more bushes 50c ea. ppd., and get our 1950 color catalog.

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FREE COLORFUL CATALOGUE

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2 BULBS, JARS and MOSS $2

Top-quality giant Bulbs 2½" dia. Famous Mead strain. Passion Red Flowers. *Guaranteed* burst into bloom soon after arrival. Easiest and largest flowers amateurs can grow at room temperature. 2 Giant Bulbs *plus* 2 copper colored Jardinieres *plus* potting material, all $2 pp.

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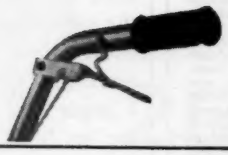
125 Madison Dept. 08A Chicago

Here it is! The world's finest, low-priced power garden implement . . . a superior new model by an old manufacturer.



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Handy-Worker ROTARY TILLER

Only

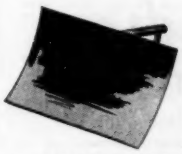
$149.50 F.O.B. Lansdale

and in addition . . . your choice—

FREE!

$13.50 HANDY-WORKER CULTIVATOR
If you purchase H-W Rotary Tiller during March

HURRY! BUY NOW . . . WHILE FREE OFFERS LAST!



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EFFICIENT — Lightweight (115 lbs.) — Easy to operate. Just guide your Handy-Worker Rotary Tiller and let the practically indestructible steel tines (guaranteed against breakage for one year) do the work of preparing your garden for spring planting and for use during the entire growing season for cultivating, moisture control and weeding. Powered with a standard make 1½ to 2 h.p., 4 cycle air-cooled engine. Power on large traction wheel, also gear reduction (2 speed) for operation of tines. Positive clutch control. Tines can be operated with or without power on wheel. Rotary Tiller can be quickly removed and tractor used to operate Handy-Worker Sickle Bar Mower, Lawn Mower, etc., available at additional cost, (see literature). All Handy-Worker equipment fully guaranteed.

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Gentlemen:
Enclosed find check or money order for $149.50.
Ship me Handy-Worker Rotary Tiller Model R and

Handy-Worker Cultivator ☐
Handy-Worker Dozer ☐
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See for yourself with this fascinating pencil size microscope. Clip it on to your pocket; you'll be proud to own one. Ideal for people in all walks of life. Holds unlimited fascination for both young and old. Replaces costly instruments. Magnifies 20X. Instant easy focusing. Excellent wide field. Aluminum body, beautiful satin finish. Hundreds of uses. Ideal for studying root and plant bodies. Better for bugs and aphids than ordinary magnifying glass (root hairs, seeds, botany). See for yourself. Order today! Postpaid $2.50.

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Ideal for the study of minerals. Observe the colors of all fluorescent materials under the 250 Watt Purple X Lamp (Black Light). Why do white onions fluoresce a pink and the roots a snow white? Potatoes fluoresce a milky blue and the peelings are wholly negative. Good humus and snails castings can easily be detected. These results and many more are obtained under this same lamp. Minerals from different sources give off different responses. Detecting earthworms and their castings, fluorescence helps to easily judge the quality and quantity of this material in the humus. Order a Black Light and three brilliantly fluorescent minerals for ONLY $2.00 Express charges collect.

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HARRY ROSS
MICROSCOPES—TELESCOPES
Scientific and Laboratory Apparatus
70 West Broadway Dept. G New York 7, N. Y.

four corners of the cloth together and carry the bundle over to my compost pile. In a minute or two with this method, one can gather the same quantity as in 10 minutes work filling bushel baskets, to say nothing of the time saved in carrying a larger load in one trip. The leaves are so light that you are limited only by the size of your cloth.

For storing leaves for my next season's mulch and for compost piles, I use 36" woven wire fencing, with loops about half the size of those in chicken wire. This wire costs about 7¢ a foot here, and a 12 foot length gives an enclosure almost 4 feet in diameter and 36" high. No tools are necessary; simply twist the wires at the two ends together to make a circular enclosure which will hold a considerable quantity of leaves. Among various advantages of this enclosure, the chief one is the ease of emptying it. The wire netting can be lifted easily with one hand, and carried wherever desired. Or, if storage is contemplated, undo the twisted wires at the ends and roll it up into a compact bundle.

I am hoping this may be of some value to *Organic Gardening*.

Fred J. Mocking
7749 S. Muskegon Avenue
Chicago 49, Ill.

—o—

EARTHWORM CASTINGS AND LEAF MULCH FOR ROSES

It may be of interest to you to know what results I have had with roses. Where I am now living, everybody told me that it is almost impossible to raise anything in that soil, for they had already tried it and had no luck. Because I am an enthusiastic sticker to the Organic method, I determined to raise roses as they had never been raised before.

This particular locality is rather unfavorable for raising flowers, because it always gets too hot suddenly.

SUPERIOR

Pachysandra

FROM TOTTY'S

TERMINALIS is an incomparable evergreen ground cover...unsurpassed as a border for walks...unusually attractive for drives...splendid for steep slopes in sun or shade...grows profusely in dense shade under any kind of trees and Pachysandra is the only kind of plant that will thrive under pine trees. It reaches a height of about 8 inches.

$3.00 per doz. $20.00 per 100

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by GOLDEN RULE DAHLIA FARM

You can't go wrong on any of the varieties named below. They make fine plants and bloom freely. The kind we specialize in. Your garden will be a blaze of color if you grow these mums.

Each item below is 50c.

Cliff Runyan—orange	Avalanche—white
Carnival—orange red	Symphony—pink
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Lavender Lady—lavender	Betty—pink
Yellow Avalanche—yellow	Winterset—white
Charles Nye—white	Huntsman—red

● Select any four and we will send you a plant of Dawn Rose (1949) free.
● Select any six and we will send you free, 2 plants of Dawn Rose and 1 Honeycomb.
● Select all 12 and we will send you free, 2 Dawn Rose, 2 Honeycomb and 2 Defiance (1949).
All postpaid before planting time. Order at once.
Send for our fine new Dahlia and Mum Book ready now.

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Fruit Trees and Plants also Ornamentals

Blueberries, Strawberries and Raspberries
Peach, Apple, Pear and Plum Trees
Evergreens and Flowering Shrubs
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In fact a full line of stock.

60 YEARS EXPERIENCE IN GROWING NURSERY STOCK AND FRUITS

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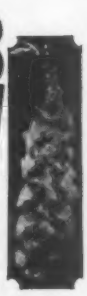
WRITE NOW FOR GOVE'S *Gladiolus Book*

80 Pages—Beautiful Pictures



For years a specialist in this most satisfactory of summer flowers. I believe my catalog is the best, largest, most up-to-date book published on Glad Culture.
I list 400 leading varieties—including this year's top introductions, old and new favorites and the best from the WORLD'S leading hybridizers. Many SPECIAL COLLECTIONS of wonderful value. You'll like the 12 Groupings—earliest, tallest, most beautiful, etc. Write today for this big GOVE GLAD BOOK sent anywhere for 6c stamps.

CHAMPLAIN VIEW GARDENS
ELMER GOVE Box G Burlington, Vt.

WHITE BIRCH Trees 20 FOR $3.50 Postpaid

16 to 24 in. Seedlings sent postpaid at planting time. Hardy all climates. Write Box 15-G for Evergreen Catalog.

MUSSER FORESTS, INC., Indiana, Pa.

In my rose bed I applied material from my worm beds. This material was placed on the bed at a thickness of three inches and then spaded under. My compost which I use in worm beds is made of an ordinary standard formula and after having had worms in it for six months, you can imagine the richness of the compost; well, it was practically 100% worm castings.

This worm bed material was applied in the early Fall of the year. After the roses were planted I immediately covered the bed with a leaf mulch to a thickness of 2 to 3 inches. This leaf mulch provides food for the soil and worms and at the same time keeps down grass and weeds and retains moisture.

To my amazement the roses grew as I have never seen them grown before. I prune them down to about 10 inches twice a year and twice a year they grow to a height of 5 to 6 feet. They bloom profusely in a blaze of brilliant colors. In my experience I find it best to prune them twice a year for they will bloom much better on new growth than on the old growth. Blooms look 100% better on new growth and furthermore you will have nice long stems which will make it much more desirable for cuttings.

Deep root watering, food, and keeping the soil loose are three big essentials for beautiful roses.

Hollis D. Bremer
La Grange, Texas

"The New Gorgeous"
QUEEN o'the LAKES (Red)

BROWNELL ROSES

Everblooming Sub-Zero
HYBRID TEAS

25 DIFFERENT COLORS and FORMS

Also 20 beautiful yellow and orange hardy Climbers.

Vigorous — Beautiful — Easy to grow. — Large abundant blooms, more constantly. — Comparable with the best.

Can live several decades even after low subzero. *Save replacement expense.* **Plants that fail, anywhere, within 2 years, replaced free, purchased from the hybridizers—**

Send for pictured List

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52 Rose Park — Little Compton, R. I.

Approved by professional engineers.

Keston ORGANIC SHREDDER

Patent Pending

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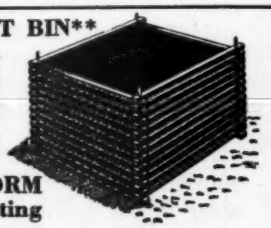

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CANCER—Part XI—Sugar

IN THE last instalment I advised the elimination of salt from the diet. In this article the prohibition is going to be against sugar. I can hear some of my readers say, "What next?" or "Let us cut out all food," because I have heard people make statements like these when I discussed these things with them. But I answer that it is not as bad as it sounds. Man is a creature of habit. There are many races that never learned of sugar and salt or did not have available supplies of them, and they have been not only healthy but extremely happy. After a few weeks of eliminating an item of food one gradually becomes conditioned to the new habit. In fact I know of cases, including my own, where persons who have eliminated sugar almost become nauseated when they look into the window of a pastry shop and see a display of sugar-laden cakes and pies where ordinarily it makes person's taste buds act up and the saliva flow. When one has a serious disease, and the doctor says, "Cut out sugar if you want to stay on this planet," it is much easier to cut it out. But why not do these things while you still have your health?

We have the wrong conception toward food. Food is a fuel to feed the fires of our bodies, which are our furnaces. Most people exert more care in the coal they choose to put into their furnaces than in the food they put into their own bodily furnaces. If they have a pig they will figure out the best diet for it so that they can have a good, healthy piece of ham, but to their own bodies they will feed "garbage." Truly they will! The average person looks on food as a source of enjoyment, something to have a good time with; perhaps, as in many cases, something to have gastronomic orgies with. Now I do not say that we should not extract pleasure from our eating, but I *do* say that we should learn to reduce that pleasure somewhat. We have been placing too much of an emphasis on that enjoyment. We must revise our psychological attitude towards food, because at the bottom of the hunger urge is a subtle psychology which we can learn to master, so as to become healthier. A healthier person can enjoy life more, with no headaches, no colds and practically no disease. So by reducing our pleasures a little at the table, we can increase our pleasures in other ways.

And here is where you must help yourself by the necessary strategy in order to cut down on food. Find other pleasures to take its place. Get a hobby. Take a correspondence course of some kind. Write a novel. Go deeper into your study of gardening. Get more music or art into your life. Go in for hiking or working for civic, religious or social organizations. Collect certain kinds of newspaper clippings. If you already have sufficient hobbies go into them deeper, more intensively. Become more expert in them. Spend some time studying the problem of how you can restore into the equation of your life the pleasure that you would lose by cutting out some types of food. In many cases food compensates when you are depressed or have worries. Arrange your way of living so as to have less depression or worries, or at least revise your attitude towards them. They won't kill you. Don't have the habit of drowning your sorrows in orgies of eating. Mastery over your taste buds will give you more mastery over your will-power in general and will take that sloppiness out of your disposition, the tendency to yield to every weakness. It will make you a better citizen and a better parent. If you give your children the example that your table is a slop-bucket, that is the pattern of example they will set to their children.

With this as an introduction let us get on into the problem of sugar and cancer. Several years ago upon a visit to St. Petersburg, Florida, I met the lady whom I mentioned in the last issue and who had been

cured of arthritis by Dr. Melvin E. Page of that city. One part of the treatment was the complete elimination of white sugar as well as salt. This aroused my curiosity. I went to see Dr. Page and was deeply impressed with the extent of his laboratory and his method of treatment. Dr. Page said that there is a normal phosphorus calcium ratio in the blood of 4 to 10, that is 4 parts of phosphorus to ten parts of calcium. But in the numerous analyses of the blood of patients who came to him this ratio was grossly distorted. Immediately on cutting out all white sugar products, including candy, ice-cream, sodas, pastries etc., he found that the phosphorus-calcium ratio returned to normal. However, in special tests, where he had patients take but a few pieces of candy, the ratio immediately became distorted.

One thing that impressed me about Dr. Page's work should be of interest to women who wish to be beautiful. He noticed that in both men and women as they eliminated sugar, they not only lost weight if they were overweight to start with, but that the lines of their faces took on a much more handsome appearance. He said that it was most uncanny what the mere cutting out of sugar did to the features of the face. It also helped to accomplish miracles in curing many terribly sick people. While I was not sick, on his advice I have not been taking sugar now for about two years. I have found that now I can get better taste from other foods. The constant eating of sugar evidently warped the functions of my taste buds. Today we are a nation of sugar-drunkards, eating over 100 pounds of sugar per year. This includes every man, woman and child in the United States. A nation like Italy (1932 statistics) eats only 18 pounds, Russia 20, Mexico 25, Spain 29. We have perverted our natural tastes.

Let us see what various physicians have done and said about sugar. Dr. A. Rabagliati in his book *Air, Food and Exercise* (1896) showed clearly that he believed in the dietary origin of cancer on the basis of carbohydrate excess. He said:

"With slight qualification we may say, that there is no disease producing material in the body which was not first in the blood and there is nothing in the blood which was not first in the food or in the air." Note what he says about air. Even back in 1896 he guessed that there might be some cancer factor in the air, perhaps sulphur compounds from coal smoke. From Rabagliati's statement about the blood we see the importance of having a well-balanced bloodstream whose phosphorous-calcium ratio is not distorted by eating too much sugar. Surely the delicacy of the processes in the blood and its relations with tissues, organs, etc., and the necessity of the slightest factor in it not miscarrying, would tell us that the blood above all must be kept in the proportions which the successful operation of our bodies demands. Especially so where there is a question of cancer.

Dr. John A. Shaw-Mackenzie in his book *The Nature and Treatment of Cancer* (1906) said:

"As long ago as 1845, Macilwain maintained it to be a pure assumption that cancer is incurable by the powers of Nature. This observer referred the causes to errors in diet or non-assimilation of food, sedentary habits, the free use of alcohol, and of greasy, fatty, and saccharine matter. He rigidly dieted his patients, excluding sugar, as some authorities at the present day also do."

Here is a quotation from Hoffman's book *Cancer and Diet* previously mentioned:

"J. Ellis Barker, a layman, in 1924 published a substantial volume on Cancer, How it is Caused; How it can be Prevented, with an introduction by Sir W. Arbuthnot Lane, which attracted world wide attention and is often quoted. The book is largely concerned with the dietary aspects of cancer which cannot be abbreviated to advantage. He emphasises the importance of vitamins and concludes in part,

"Modern civilized feeding has two great characteristics. Civilized nations are being starved of vitamins in the form of green vegetables and especially of uncooked vegetables, such as salads. They are starved of vitamins in the form of the outer skin of every kind. They are starved of the vitamins contained in uncooked milk and in fresh meat. While civilized men and women are being starved of all these essentials, they are being supplied with a superabundance of sugar. The increase in the consumption of sugar has been as extraordinarily great and as rapid as has been the diminution in the consumption of vitamins.

"He calls attention to the enormous increase in the per capita consumption of sugar, quoting Hutchinson to the effect that in strong solution sugar is a irritant to the tissues. In contact with the skin, it is apt to set up superficial inflammation. Furthermore he observes,

"The instinctive feeling of hale old people and of the most experienced old practitioners that immoderate consumption of sugar is very harmful is borne out of observation and by the latest discoveries of science. Everybody knows extravagant sugar-eaters. They are usually chronic dyspeptics. Very bad odours

Have You Read the foregoing Editorials on Cancer?

This series of articles on CANCER began in the May, 1949 issue of this magazine. They constitute a comprehensive discussion of what has been learned but is not generally known about this dreaded degenerative disease. Consideration has already been given to relationships which appear to exist between cancer and such common materials as artificial fertilizers, deranged protein, sulphur, and common table salt.

emanate from them, and they have a wretched complexion. As a rule, they are very constipated and are bad-tempered. Over-fondness of sweets almost invariably goes together with a dislike of vegetables and of fresh fruit and of fresh meat. Thus over-indulgence in sweets seems somehow or other to lead to vitamin starvation with all its very serious consequences."

Hoffman mentions Dr. Bernhard Fischer-Wasels, Director of the Pathological Institute of the University of Frankfort, who in a monograph on *Methods of Preventing Cancerous Diseases* was emphatic in pointing out the danger and harmfulness of an excessive carbohydrate nutrition, and the danger and harmfulness of excessive sugar intake.

In an editorial called "Food and Health" in the *Journal of the American Medical Association* of February 13, 1932, appeared the statement:

"Sugar, once consumed in quantities less than ten pounds per annum for each person, is now used to ten times this extent—more than a hundred pounds in the course of a year. Greater availability and low costs have transformed what was merely a condiment into a food that supplies one seventh or more of the nation's calories... American food habits should become rationalized with respect alike to health and to economy."

Hoffman quotes C. V. McCollum, who is one of the world's greatest nutritionists, as saying:

"Nature did not intend that we should eat much sugar, such as glucose and cane sugar, else our natural foods would have contained more of them. Primitive man never had sugar in amounts greater than are afforded by sweet fruits, except when he secured occasionally a temporary supply of honey. Nature provides starches in abundance, and these we digest into simple sugars. This process requires considerable time, so that several hours elapse between the eating of a few ounces of starch and its complete absorption from the intestinal tract. When we take sugars which are soluble and easily absorbable, they tend to enter the blood too fast and to tax the body's capacity to take care of them. If much sugar is eaten at one time, there is a tendency to create a high tide of sugar in the blood. This is a very undesirable condition to establish since it taxes the pancreas... We should never lose our appreciation of the bland flavors natural to fruits, vegetables, meats, etc., through masking them with sweetness, spices, pepper, flavors, acids, etc.... We are as a nation, eating so much sugar that we are crowding out of the diet a considerable amount of other foods which would be far better for us than is sugar." Hoffman follows this with his comment: "It may be pointed out in this connection that the United States has the highest diabetes death rate in the world and the death rate continues to increase from year to year, regardless of insulin treatment which inhibits the disease but does not cure it."

Plimmer and Plimmer in their treatise *Food and Health* (1925) said:

"Not so very long ago sugar was a rare luxury kept under lock and key in the tea caddy. At the end of the eighteenth century the manufacture of beet sugar was begun in Germany and the industry developed rapidly and lowered the price of sugar. Its consumption has increased enormously and is still increasing in all civilized countries. The Americans, with their love of candy, are the largest sugar eaters in the world. Incidentally, cancer and diabetes, two scourges of civilization, have increased proportionately to the sugar consumption."

Hutchison and Mottram in their book *Food and the Principles of Dietetics,* say:

"The second factor which influences the digestibility of a sugar is the degree of concentration of its solution. In strong solution sugar is an irritant to the tissues. In contact with the skin, it is apt to set up superficial inflammation. This is familiar in the form of the eczema which is apt to appear in diabetes from the contact of the sugar-containing urine with the skin, and from the similar condition occurring on the arms of grocers and other persons who have frequently to handle sugar, and it is on account of its irritating properties that sugar cannot be used as a subcutaneous aliment, though otherwise well adapted to fulfill that function. All attempts to use it in that fashion have been frustrated by the pain which it sets up. The same is true of the stomach."

In other words these two doctors show that excessive use of sugar irritates the stomach and the intestines. They state further:

"This irritating effect on the mucous membrane is accompanied by the production of much mucous and the pouring out of a highly acid gastric juice. These irritating effects seem to be much more pronounced in the case of cane-sugar than in that of glucose."

Hoffman continues:

"J. Ellis Barker, in an extended discussion on *The Faults of Modern Feeding,* quotes a paper by Dr. Nathan Mutch, concluding that, 'We cannot wonder that heavy consumption of sugar leads to gastro-intestinal disorder of every kind, followed by various serious diseases, among them cancer.' "

In a French health magazine called *La Vie Claire,* there is now running a series of articles entitled *White Sugar and its Effects on the Body* by Dr. Victor Lorenc which describes certain conditions caused by consuming white sugar. He states:

"Chronic excess of glucose in the blood is a very serious condition. A few dentists who are at the same time scientists have definitely noted that expulsive gingivitis (loss of teeth) accompanies chronic excess of sugar in the blood. Eye doctors also agree that this excess threatens the soundness of the sight." He states further:

"This sugar is a soluble food of which nothing slows down the delivery. It falls into the intestine as

though from a waterspout, transforms itself in the twinkling of an eye into glucose, and overexcites the intestinal villi, which send it in mass to the liver. Now our liver has been conditioned by a thousand years in the past which knew nothing at all of the avalanches of glucose let loose by today's industrial sugar. Thus the liver cannot prevent a temporary excess of sugar in the blood. Each cell of the body will have to suffer for this defeat, including those of the liver itself."

Effect on Nervous System

Dr. Lorenc comments in an interesting manner on the effect of sugar on the nervous system. He says:

"The few doctors, who have compared a diet of industrial sugar with a good diet which is free of it, have been able to observe the nervous irritation which sugar causes in children. Because they are more delicate, women and children show more clearly the effects of industrial sugar. With women, sugar causes pains during menstruation. Here is the case of Sophie Zaikowska. An old woman, she has been a vegetarian since 1902, but she used to take a daily consumption of approximately 100 grams of industrial sugar. At the age of 30 her menstruation became extremely painful. This discomfort disappeared completely with the suppression in 1911 of this 'murderous food.' "

"Since that time we have been able to observe many analogous cases. This fact ought to be known and spread abroad by workers with women. Sugar abstainence rids a woman of what is known as 'natural weakness,' that is to say, of nervousness and incapacity to work which are often the result of difficult menstruation.

Sugar Brings on Fat Which Is Dangerous

"Sugar brings a brutally copious afflux of glucose to the liver, which stores as much of it as it can. Nevertheless, it cannot hold more than 150 grams of glycogen, so it transforms the excessive glycogen into fat globules, which are distributed a bit here and there throughout the body, especially in regions where the muscles do little work: over the stomach, over the hips, and under the chin. Fat is not to man's advantage; it is rather a source of trouble. Young people are generally thin, but with age the body defends itself less well. After 30, the fattening effect of industrial sugar shows up more intensely with many people.

"According to a study undertaken by the collaboration of 43 American life-insurance companies on three numerically equal groups of people over 45, the incidence of diabetes in these groups showed up as follows: in the group of *very thin* people there was one case, in the *normal* group there were five cases, and in the *fat* group there were 227."

(To be continued—Next article *Sugar and Cancer.*)

Editor's Note: This entire series may be reprinted free of charge by any newspaper or magazine.

A LETTER ABOUT CANCER

Dear Mr. Rodale:

Approximately 40 years ago my mother migrated to these shores from a village in old Bohemia. There life was frugal, and the potato constituted a large important part of the diet—but, it was organically grown. In all the sixteen years she lived there, only two known cases of cancer occurred in her village and in the villages of the surrounding countryside. I mention the above to show that the organically grown potato apparently has no effect on the advance of cancer. However, let's skip from that distant day and country to the present, and pick out a few factors from your currently running series on cancer. First we find a Mr. C. E. Green established the fact that lime is a deterrent upon the cancer rate in certain industries, and that a Professor Schrumpf-Pierron discovered potash to be present in excess in soils where cancer was most prevalent.

Now, let us apply these two factors to our modern methods of growing present-day potatoes, and see how well they fit in. We are aware of the fact that the commercial potato grower is harassed by a disease known as potato scab which prevails in many neutral or near neutral soils. In order to evade this disease, he plants in soils of very low pH—and, striving for maximum yields, he uses huge amounts of chemical fertilizers which contain high percentages of potash. Thus we find our basic food, the potato, grown in low-lime, high-potash soil. This to me is very significant, to say the least, in view of the findings of Messrs. Green and Schrumpf-Pierron.

Next let us move on to the analysis of cancer rates by States. Here we find the highest rates prevail in the Northern and Eastern States. The populace of these states for the most part are the greatest potato eaters that we know. Down South the cancer rate drops sharply especially in the poor states like Alabama, Georgia, Mississippi, and North and South Carolina, but the natives of these states are known to depend upon and use corn for their basic food—not potatoes. This factor, I believe accounts for the sharp drop in the cancer rates of these southern states. California and Florida, you will note, are exceptions and disprove the fact that climatic conditions effect the cancer rate. However, the populations of these two states contain large percentages of Northerners and Easterners (potato eaters) who migrated to these states in recent times. This accounts for the higher cancer rate of these two states.

We also learn that the Hopi—Navajo Indians are almost immune to cancer. These Indians do not eat our low-lime, high-potash potatoes and the consequence is quite obvious. Present day Europeans grow and consume low-lime, high-potash potatoes as their basic food with disastrously high cancer rates. Italy, Spain, and Greece, I believe,

depart somewhat from the above with consequently lower cancer rates. The Orientals of the Far East definitely are not potato eaters and their cancer rate indicates it. The same applies to the tropical countries as well.

I sincerely believe that more research will prove and bear-out all of the above deductions, for the two British scientists, Chich and Slack, have shown that potatoes do have an effect upon or connection with the all-important protein. Surely all these factors cannot be merely coincidental. With them I believe I am justified in condemning the chemically grown, low-lime, high-potash potatoes as the greatest single contributing factor in the advance of cancer.

If you, Mr. Rodale, have any reasonable grounds to refute my deductions, I would be extremely grateful to hear them.

George F. Finkes,
4290 E. 134th St., Cleveland 5, O.

(*Note from J. I Rodale*): The above letter is extremely interesting but I would have to study the potato more to make an intelligent comment. But I can say this, that the potato, the way it is grown and sprayed, today, is destroying its own market. Restaurants are beginning to reject it every once in a while. Consumers tell me the potato rots and turns black easier. All this is not well with the commercial potato today. It would pay gardeners to obtain the use of empty lots in their town to grow organic potatoes without spray.

The fact that Mr. Green showed a significant difference in cancer rates in Scotland and France as between coal-burning and wood-burning communities, (wood containing little sulphur) would seem to indicate that sulphur *is* somewhat of a factor in cancer. There are many other factors in the causation of cancer. Potatoes are probably in a class with many other foods that are not only raised with chemical fertilizers but are sprayed with poisonous insecticides and disease inhibitors. As a class they must be a factor in producing cancer.

TRY TRITOMAS

By CHARLES APPLEGATE

THE first tritomas available to home gardeners were not completely hardy and had to be lifted and stored inside over winter. Some of these and improved forms of them are still grown in warm sections of the country. These have been crossed with hardy but less attractive sorts. Quite a number of hardy tritomas are now available for home gardeners at a very reasonable price. The tritoma is sometimes listed as *Kniphofia*

These plants are so different from most garden plants that they are sure to attract attention. They begin growing in early spring and by June make thick clumps of long grassy leaves. Out of these masses of leaves grow bare slender stems topped by long clusters of tiny tube-shaped flowers. This helps explain why they are called Red-Hot-Poker or Torch Lily. The flowers at the bottom of the cluster open first. Sometimes they fade to a lighter color so that the cluster has a two-tone effect. Tritomas are good for cutting and come in shades of red, orange, yellow, or white. They vary in height too. The long clusters are very effective when cut and used with yellow callas, or other flowers of a similar color but a very different shape.

Tritomas are very easy to grow. Plant them in spring and let them have plenty of room. They like a rather rich soil, a fair amount of water, and full sun. About all the feeding they need is a yearly mulch of strawy manure. They should be mulched with straw in winter.

Springtime is one of the best hardy varieties. It is of medium height and blooms in July. The spike is red at the tip and the older flowers fade through orange and yellow to almost white, giving the clusters a sky-rocket

(*Continued on page* 51)

SEMINAR ON MANURE

ACCORDING to Soils and Men, the Agriculture Yearbook for 1938, the annual production of manure on American farms amounts to one billion tons. Properly used, this manure is capable of producing three billion dollars worth of increase in crops. The potential value of this agricultural resource is three times that of the Nation's wheat crop and equivalent to $440 for each of the country's approximately seven million farmers. The crop nutrients in the manure alone would cost more than six times as much as was expended for commercial fertilizers in 1936. Its organic matter content is double the amount of soil humus annually destroyed in growing the Nation's grain and cotton crops.

Unfortunately only a small fraction of the potential crop producing and soil-conserving value of manure is actually used. Approximately half of the excrements from farm stock is dropped on pastures and uncultivated ground. Vast amounts of manure in stockyards, piggeries, poultry farms, and other animal industries are considered worthless wastes and are dumped on uncultivated lands. On most farms the manure is so badly handled that it suffers enormous losses of nitrogen through improper fermentation and drying, and of nutrients due to the draining off of the urine and leaching of the solid portion of the manure by rain and surface water. Fermented manure loses ammonia if allowed to dry on the field before it is worked into the soil. There is also a loss as a result of the inefficient use of manure as, for instance, when it is not applied at the season, in the manner, at the rate, or to the crop which would give the greatest return. In view of these facts it is safe to assume that only from a third to a quarter of the potential value of the manure resource of the country is now realized. The present wasteful and inefficient methods of using manure seen in all sections of the country are sufficient evidence that many farmers do not understand the true nature of manure, the perishable character of its most valuable constituents, and the direct money loss incurred through its improper treatment. This situation is doubtless due in large part to the increased use of artificial chemical fertilizers during the past twenty-five or fifty years.

Steers in a loafing stable, making and preserving manure on Rodale Farm.

WHAT IS MANURE?

Farm manure is the mixture of animal excrements with soiled bedding, inedible or uneaten parts of animal feeds, and other organic matter which accumulates in the stables. Manure is of value in soil improvement because of humus, its content of plant nutrients, and of certain organic constituents. Its value for maintaining and improving the productivity of the soil has been recognized from the earliest times.

MANURE WAS VALUED BY GREEKS AND ROMANS

Tradition has it that King Augeas (a king of Elis) was the first in Greece to make use of manure, and that Hercules introduced the practice into Italy. M. Varro assigns the first rank for excellence to the dung of thrushes kept in aviaries, and praises it as being not only food for land, but excellent food for oxen and swine as well. Columella gives the second rank to pigeon manure, and third rank to poultry manure. Next to these, the dung of swine was highly esteemed. Dungs rated as less in quality were, in order, that of goats, then of sheep; after which came that of oxen, and last of all, that of the beasts of burden. Such were the distinctions that were established between the various manures among the ancients. The ancients also doubtless composted their manures in some regions, for we read, ... "In some of the provinces, too, which abound more particularly in cattle, by reason of their

prolific soil, we have seen the manure passed through a sieve like so much flour, and perfectly devoid, through lapse of time, of all bad smell or repulsive look, being changed in its appearance to something rather agreeable than otherwise."

Varro believed that corn (small grains) land should be manured with horse-dung, that being the lightest manure of all, while meadow land, he said, thrives better with a manure of a more heavy nature, and supplied by beasts that have been fed upon barley.

WHAT IS OUR PRESENT UNDERSTANDING OF THE CONTENT AND VALUE OF MANURE?

The most common domestic animals which serve as a source of manure are horses, cattle, goats, sheep, pigs, rabbits, and poultry. The dung consists of the undigested portions of the foods which have been ground into fine bits and saturated with digestive juices in the alimentary tract. It also contains a large population of bacteria which may make up as much as 30 per cent of its mass. Dung contains, as a rule, one-third of the total nitrogen, one-fifth of the total potash, and nearly all of the phosphoric acid voided by the animals. Its constituents are not soluble and therefore not immediately available as plant nutrients.

The urine contains compounds from the digested portion of the foods and secretions from the animal body. The urine usually contains about two-thirds of the total nitrogen, four-fifths of the total potash, and but very little of the phosphoric acid voided by the animal. Because they are in solution, the elements in the urine are or become available as plant nutrients much more quickly than the constituents found in the dung.

The value of animal manure varies with the food eaten by the animal, the age of the animal, the products yielded (as milk, wool, or meat), and the physical condition and health of the animal.

The richer the food is in the elements which are essential to plant growth, the more valuable will be the manure. The manure of animals fed on wheat bran, gluten meal, and cottonseed meal, for instance, will be much richer in nutrient elements than from animals fed with straw or hay without grains.

The manure of young animals, which are forming bones and muscles from their foods, will be poorer in nutrient elements than the manure of mature animals.

The value of the manure varies also according to the animal products which are made, as milk which contains considerable amounts of nitrogen, phosphorus, and potassium; wool which contains a large amount of nitrogen; and beef which contains practically all the elements necessary for plant growth.

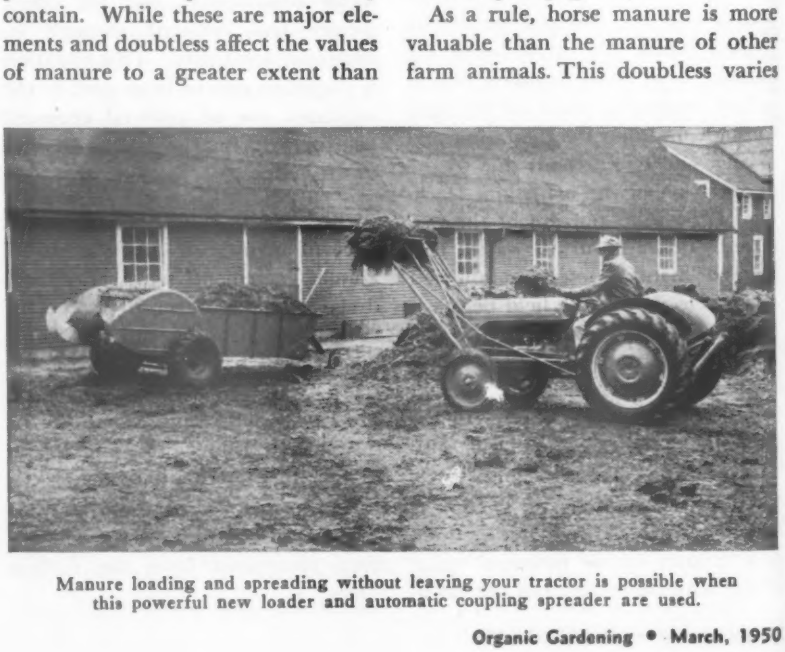
Sometimes cattle are grown in regions with mineral-rich soils and fattened in regions where carbonaceous foods are abundant and cheap. The manure from mature animals which are being fattened is relatively rich in minerals, as fat contains little or no minerals.

Unfortunately the values of manure and fertilizers in general have been, in the past, based on the relative amount of nitrogen, phosphoric acid, and potash which they contain. While these are major elements and doubtless affect the values of manure to a greater extent than the proportion of any other constituents, it is misleading to make a direct comparison between farm manures and artificial chemical fertilizers on the basis of the relative amounts of N, P, and K. Soil needs organic matter to keep it alive. Organic matter in the soil is converted into humus, and humus plays an important role in making the nutrient elements in the soil available to the higher plants.

The average composition of farmyard manure, based on many analyses made at the Experiment Station, Amherst, Massachusetts, was found to be water, 67.7 per cent; nitrogen, 0.465 per cent; phosphoric acid, 0.326 per cent; and potash, 0.485 per cent.

It has been estimated that 80 per cent of the manurial constituents found in the food of milk cows will be voided in the excrements. In fattening cattle and hogs, as much as 90 per cent of the nutrient elements in the food are voided. By keeping these percentages in mind, it is not difficult to calculate the amount of nitrogen, phosphoric acid, potash, and other elements in the manure when the compostion of the feeds is known. The nitrogen, phosphoric acid, and potash content of common feeds are given in the table at the top of page 21.

As a rule, horse manure is more valuable than the manure of other farm animals. This doubtless varies



Manure loading and spreading without leaving your tractor is possible when this powerful new loader and automatic coupling spreader are used.

Kind or Feed	*Percentage Composition*		
	Nitrogen	*Phosphoric Acid*	*Potash*
Corn fodder	.41	.15	.33
Oats, green fodder	.49	.13	.38
Soybeans, green fodder	.84	.20	.71
Corn silage	.42	.13	.39
Timothy hay	1.19	.33	1.40
Salt hay	1.06	.23	.65
Millet hay	1.22	.46	1.61
Red clover hay	2.01	.41	2.11
Cottonseed meal	6.70	2.47	1.83
Gluten meal	6.4	1.43	1.06
Wheat bran	2.36	2.10	1.40
Wheat middlings	2.75	1.25	.75

with the amount of grain which is included in the diet. Grains are relatively high in all plant nutrients. Horse manure is richer in nitrogen than either cow or hog manure and is much more liable to fermentation. For this reason it is frequently referred to as a *hot manure*. Another hot manure is that of sheep which is generally quite dry and quite rich. Cow manure and hog manure are relatively wet and correspondingly low in nitrogen. Because of their high water and low nitrogen content, these manures ferment slowly and are commonly regarded as *cold manures*.

It is worth noting that the urine of most animals contains more nitrogen and more potash than the solid excreta. Unfortunately farm manures are handled in such ways that most of the urine is carelessly allowed to escape into drains which lead it off the farm. Urines are especially valuable as activators in converting crop residues into humus.

COMPOSITION OF FARM MANURES

Farm manures vary a great deal in chemical composition according to the animal and the kind of food substances that have been consumed. Food plants low in minerals will yield manures correspondingly low in fertilizing value. Analyses of farm manures as reported from the New York, Massachusetts, and Connecticut Experiment Stations are given in the table below:

Kind of Manure	*Moisture*	*Nitrogen*	*Phosphorus*	*Potash*
Cattle (fresh excrement)		0.29%	0.17%	0.10%
Cattle (fresh urine)		0.58	...	0.49
Hen manure (fresh)		1.63	1.54	0.85
Horse (solid fresh excrement)		0.44	0.17	0.35
Horse (fresh urine)		1.55	...	1.50
Human excrement (solid)	77.20	1.00	1.09	0.25
Human urine	95.90	0.60	0.17	0.20
Night soil		0.80	1.40	0.30
Sheep (solid fresh excrement)		0.55	0.31	0.15
Sheep (fresh urine)		1.95	0.01	2.26
Stable manure, mixed	73.27	0.50	0.30	0.60
Swine (solid fresh excrement)		0.60	0.41	0.13
Swine (fresh urine)		0.43	0.07	0.83

FRESH vs. ROTTED MANURE

If we assume that fresh manure is a normal mixture of urine and feces and that conditions have been controlled, fresh manure differs from rotted manure in composition as follows:

1. Rotted manure is richer in plant nutrients. This is a result largely of the loss in dry weight of the manure. One ton of fresh manure may lose one-half its weight in the rotting process.

2. The nitrogen in the composted (rotted) manure has been fixed by microorganisms. These organisms build the soluble nitrogen compounds into their own bodies. The nitrogen in the urine is used in the formation of complex proteins during the decomposition of the manure.

3. The solubility of the phosphorus is greater in the composted manure. If leaching can be prevented, there is no change in the total amount of phosphorus and potassium. Precautions must be taken to prevent the loss of nitrogen in the composting process.

WHAT IS THE COMPOSITION AND VALUE OF POULTRY MANURE?

Studies of poultry manure made at the Pennsylvania State Agricultural Experiment Station indicate that laying hens, on the average, produce 138 pounds of fresh manure annually having a moisture content of about 76 per cent. A turkey produces 339 pounds of fresh manure with a moisture content of 74 per cent. The N-P-K- composition of fresh hen manure was found to be 1.48 per cent nitrogen, 0.96 per cent phosphoric acid, and 0.47 per cent potash. Fresh turkey manure contains 1.31 per cent nitrogen, 0.71 per cent phosphoric acid, and 0.49 per cent potash. Both hen manure and turkey manure tend to lose nitrogen as they age. The loss of nitrogen may be reduced by drying or other methods the simplest and most efficient of which is the dropping pit. The henhouse should contain a brick-sided compost pit large enough to accommodate the bird population. Over the pit are placed coarse wire screening and roosts. The hens loaf and sleep over the pit and the droppings fall into the pit and are immediately composted so that the nitrogen is fixed and unable to escape into the air. Such composted poultry manure can be applied to the soil immediately before seeding or transplanting vegetable crops.

Composted manure is best spread on the field with a manure spreader.

HOW SHOULD MANURES BE STORED?

Unless manures can be properly stored and protected without loss through oxidation and leaching, it should be spread on the land, winter and summer, as soon as possible. In no case, however, should it be applied on land with a considerable slope so that it is washed off during the winter months.

The methods by which manures are stored and kept affect their value to a greater degree than any other one factor. It is almost impossible to prevent loss of nutrients entirely. Sources of loss are (1) escape of the natural drainage occurring in manure, (2) leaching caused by soaking of water through the manure, and (3) losses of the gases of fermentation into the air. Perhaps the best storage is in watertight, covered pits. If stored in the open, manure should be heaped on a level or slightly concave place with a clay base to prevent seepage of the juices into the soil. The heap should be made so high that rain will not soak through from top to bottom, and the top of the heap should be slightly concave to catch rain water. It is well also to cover the heap with a thin covering of topsoil if it must stand for a long time.

In the enclosed pit, the manure soon becomes impregnated and completely enclosed by an atmosphere of carbon dioxide having also a relatively high humidity. Under these conditions manure breaks down semi-anaerobically to form a product that is unusually high in the important nutrient elements. There seem to be very little or no losses of nitrogen or other elements when manures are fermented in a properly constructed enclosed pit. The conditions which affect the fermentation or other decomposition of manures are temperature, degree of compactness of the manure, degree of moisture, and the composition of the manure itself. It is especially important to prevent the manure from drying out. When too dry the manure turns white and is said to be 'fire-fanged.' In this condition manure has lost a considerable portion of its nitrogen, and some of its organic matter which has escaped into the air as carbon dioxide.

The amount of manure that can be produced by various animals can be determined by multiplying the dry matter consumed in the foods by an appropriate factor. For the horse, multiply the weight of the dry matter consumed by 2.1; for the cow, the factor is 3.8; for the sheep the factor is 1.8; and for poultry, the factor is 1.6. To the product of each of these weights, add the weight of the bedding or litter to determine the total amount of manure that will be made.

WHAT LOSSES MAY MANURE SUFFER?

The loss of the urine rich in nitrogen and potassium has already been mentioned. Other losses occur as the result of leaching, scattering, and volatilization. Commonly manure is thrown in the barnyard or other exposed place where it is unprotected from rain. Not infrequent-

ly the rain water from the barn roof drains into the manure. If the manure is thrown in small, loose, open piles and exposed to rains, it may, in the course of six months, lose more than half of its fertilizing value. Leaching losses include the nitrogen, phosphorus, and potassium from the solid portion as well as from the urine. So often manure is tramped into the mud of lots or dropped in roads and other places where it can not easily be gathered and returned to the land. Or often manure that has been carefully piled may be scattered by chickens, hogs, or other livestock.

Organic matter and nitrogen in some volatile form are lost by passing into the air in gaseous form. In the decomposition of the manure, the ammonia produced combines with carbonic acid to form ammonium carbonate and bicarbonate. Losses may be prevented or reduced by the direct hauling of the manure to the field or by protecting it from the various factors which are responsible for the losses. Manure spread on the land and worked into the soil is perhaps in its safest place. The soil has the capacity to rapidly fix large quantities of the plant nutrients carried in the manure. Very little loss as a rule occurs when manure is hauled directly to the field, except when it is spread on hillsides or on frozen ground, where it may be washed down the slope. In any case, it is better to have the liquid go into the soil where plants are to be grown than to allow it to be absorbed by the barnyard soil or to be washed away in surface drainage.

The ease with which manures may suffer losses from runoff of the urine is indicated in the following table.

Kind of Animals	*Nitrogen*	*Phosphoric Acid*	*Potash*
Horses	35	0	58
Cattle	53	5	71
Sheep	63	4	86
Hogs	32	13	55

Leaching by rain may be even more serious, as the total soluble matter is thus removed. A single heavy rain of 1½ inches is equivalent to about one gallon of water per square foot, most of which will percolate through manure in shallow piles and remove a large part of the soluble material in doing so.

	Percentage of Farm Manure Soluble in Water			*Organic*
Kind of Animal	*Nitrogen*	*Phosphoric Acid*	*Potash*	*Matter*
Horses	53	53	76	5
Dairy Cows	50	50	97	7
Sheep	42	58	97	7
Steers	56	36	92	7

HOW MUCH MANURE IS PRODUCED BY COMMON FARM ANIMALS?

The amounts of fresh excrements produced by farm animals are subject to wide variations, being governed by the kind of animal, age, amounts of food, activity, and other factors. A general idea of how much is produced is given in the following table:

	Amount of Excrements Per 1,000 Pounds Live Weight Per Year		
Kind of Animal	*Total Excrements*	*Solid*	*Liquid*
	Pounds	*Pounds*	*Pounds*
Horse	18,000	14,400	3,300
Cow	27,000	19,000	8,000
Pig	30,500	18,300	12,200
Sheep	12,000	8,300	4,200
Hen	8,500		

WHAT DECOMPOSITION CHANGES TAKE PLACE IN MANURE?

The decomposition changes which take place in manure are briefly as follows:

1. Decomposition of urinary nitrogen. The first change is the formation of ammonia in urine which is lost unless the manure is kept moist and compact.

2. Decomposition of insoluble nitrogen. Next the insoluble nitrogen contained in the solid parts of the excrement undergoes putrefactive changes with the formation of ammonia.

3. Convertion of soluble into insoluble nitrogen. The ammonia and other soluble compounds of nitrogen are used in considerable amounts as food for the bacteria in the manure and are stored in their bodily substance in insoluble form. This nitrogen becomes available when the bacteria die and undergo decomposition.

4. Formation of free nitrogen. Under certain conditions ammonia and nitrates are decomposed with the formation of free nitrogen which escapes into the atmosphere and is thus lost permanently.

5. Decomposition of nitrogen-free compounds. The fibrous parts of the manure which are made up largely of cellulose, lignin, and other complex carbohydrates are eventually broken down with the escape of the carbon into the atmosphere in the form of carbon dioxide, and hydrogen in the form of water. These elements, carbon and hydrogen, escape in such amounts that from ¼ to ½ of the original dry matter in the manure is lost. This is the reason for the great shrinkage in bulk during decomposition.

HOW DO FRESH AND DECOMPOSED MANURES DIFFER?

Some differences between fresh manure and decomposed manure are as follows:

1. Decomposed manure is richer in plant-food constituents.

2. The nitrogen in fresh manure is largely in soluble form, while the nitrogen in decomposed manure is not water soluble, as it is an essential part of the bodies of soil organisms.

3. Phosphorus and potash are more soluble in the decomposed manure.

ARE FARM MANURES EQUALLY BENEFICIAL TO ALL CROPS?

No. Some crops are benefited by the application of barnyard manure, while others are damaged or produce crops of poor quality. A good practice is to add manure to the soil for the growing of crops which are benefited by manure, while the unused residue is left for manure-sensitive crops the following year.

1. Grass-lands are generally much benefited by top-dressing with farm manure, either fresh or fermented.

2. Root crops usually respond most satisfactorily to generous applications of stable manure. Some precautions, however, must be taken in the case of potatoes and sugar beets. Excessive amounts of fresh manure on light soils and loams cause the beets to become very large but with a low sugar content. Fresh manure creates conditions which favor potato scab and an overgrowth of the potato tops.

3. Corn, millet, and leafy crops in general respond favorably to manure, fresh or decomposed.

4. Garden crops in general respond quite favorably to generous applications of manure.

5. Young deciduous trees and shrubs respond favorably to manure, but prefer the decomposed manure.

6. Cereals are injured by large applications of manure. The straw of wheat and barley in particular grows very large at the expense of the grain. This condition favors lodging.

7. Tobacco develops large leaves of coarse texture and poor quality when treated directly with large amounts of stable manure.

SHEEP MANURE

Q. Can sheep manure, purchased from a fertilizer house, be used for making compost?

A. Yes. Sheep manure is generally dry and rich in nitrogen and potassium as indicated in an earlier section of this seminar. When properly aerated in the compost heap, sheep manure undergoes decomposition quite rapidly, and heats quickly.

POULTRY DROPPINGS

Q. How would you use droppings from poultry in the compost heap?

A. Droppings from poultry are either pure dung on a dropping board or a mixture of dung and litter on the floor. It is well to mix the pure manure with water when adding it to the heap as it will then better mix with the plant materials in the heap and cause more rapid decay than when applied as a layer in dried form. Chicken manure contains more nitrogen than any of the other manures and a one inch layer would be enough if the layer system is used. When mixed with litter, a thicker layer can be used depending upon the amount and nature of the litter.

DOG MANURE

Q. We have the excrements from seven dogs. Can these be used for composting? How should we go about it?

A. Dog manure can be used in the compost heap, in fact, it is the richest in phosphorus if the dogs are fed with proper care and given their share of bones. It would be advisable to use with it a mixture of leaves and green matter such as grass clippings, garden and kitchen refuse, and other plant wastes. Citrus peels and other fruit wastes are rich in potash and should be used. It may be wise to arrange the heap so that it cannot attract dogs, which can best be accomplished by using a suitable enclosure.

RABBIT MANURE

Q. Can rabbit manure be used in making compost?

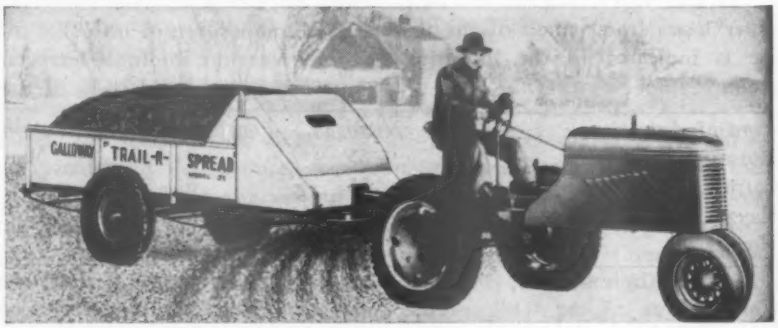
A. Rabbit manure has the same value as other manures in making compost. The rabbit manure contains organisms which cause decay without producing heat and is thus classed as a *cold manure.*

COMPOST WITHOUT MANURE

Q. How can one build a compost heap if fresh manure is absolutely not available?

A. If animal manures are not available it is well to cut or shred the plant materials as finely as possible so as to expose a maximum amount of surface to the organisms of decay. The heap of such finely ground plant materials, as soon as the heat has subsided, may be inoculated with earthworms which have been especially bred for the compost heap and soils rich in organic matter. The earthworms will supply the manure and the various animal excretions. Or the heap may be inoculated with special strains

(*Continued on page* 52)



Manure and composts are the foods that keep the soil living.

A Page from Nature's Flower Garden

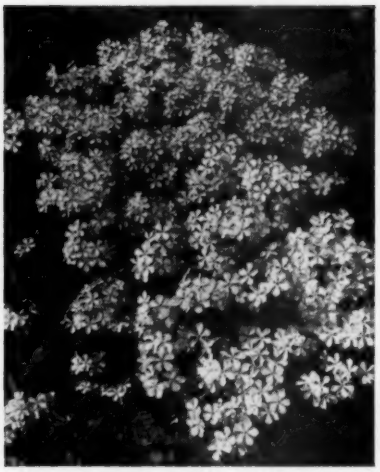
White Trillium
Trillium grandiflorum

Lady's Slipper
Cypripedium acaule

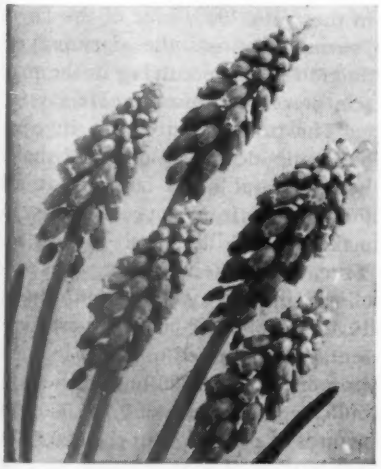
Virginia Cowslip
Mertensia virginica

Butterfly milkweed
Asclepias tuberosa

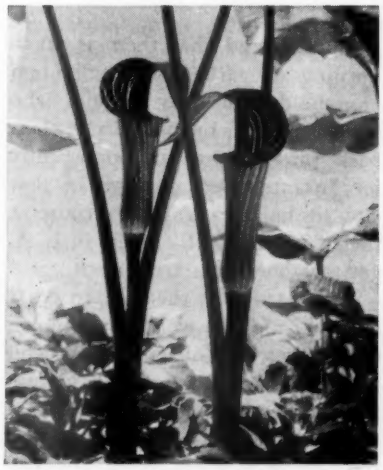
Wild bergamot
Monarda didyma



Blue Phlox
Phlox divaricata



Grape hyacinth
Muscari racemosum



Jack-in-the-pulpit
Arisaema triphyllum

Poets' narcissus
Narcissus jonquilla

Miscellany . . . .

READERS often write to inquire how they can enter the organicultural picture in a business way. Here is a suggestion for all it is worth, and it came about in this way: I met a man, who is in the wholesale vegetable business and he related to me an interesting thing about the price of potatoes. He said that for ten years the price of the locally produced potatoes, here in the Lehigh Valley of Pennsylvania, and of Canadian potatoes that come in here has been the same, but that this year the Canadian potatoes command a much better price. The local price is $1.75 a hundred pounds, the Canadian $2.75, about a 60% premium. Why? Because the local ones have been sprayed to such an extent that they have an objectionable taste. In Canada they are still a little closer to nature, using less chemical fertilizers.

As this man spoke to me I realized what a power for good he could be as he made contact with his farmer customers. If he were educated to the facts of the organic versus the chemical concept, he could educate the growers that eventually they could make more money by following the organic method, and at the same time do a good deed to their fellow man by giving them a nutritionally superior food. So here is the idea: Where are there a few young, aggresive men, with capital, among our readers to go into this business? Also readers, who may buy from established dealers in their cities, should call upon them and explain, how they could be a factor in preventing our soils and health from going to ruin. The trade must be educated.

SMOG

Those who have read the chapters in the cancer series on sulphur in coal smoke will be interested in the following from the Citizen-News of Hollywood of Dec. 17, 1949:

"The assembly interim committee on water pollution today studied recommendations by an Ohio air pollution expert for controlling smog formations in Los Angeles and other California industrial areas.

"Dr. Clarence A. Mills, of the University of Cincinnati, told the committee in Sacramento late yesterday that a lot of the impurities in an estimated two to three thousand gallons of air breathed by one person in a day are retained in the lungs.

"He said there was a definite relationship between heavily polluted air and the number of cases of such respiratory diseases as pneumonia, tuberculosis and lung cancer, according to a United Press dispatch. Mills said he discovered this through research work around the steel mills and chemical plants of Pittsburgh, Cincinnati and Chicago.

"Mills suggested immediate steps be taken to control principal industrial offenders whose waste products sometimes pollute parts of the San Francisco Bay area atmosphere.

"On Los Angeles' peculiar eye-irritating smog, Mills suggested control of trash burning in the Los Angeles area and added that trucks and city buses were 'large contributors' to air pollution.

"The committee said it would 'encourage' county public health officers to submit uniform studies, with possible research work to be done by the University of California."

I understand that there is much burning of garbage by individual householders in Los Angeles who have their own incinerators in their back yards. What an opportunity for an intensive campaign in that city to have each family compost their garbage. Will readers in L. A. get together and start something?

Perhaps one of the men to do it is Vick Knight, a well-known movie and radio writer of Hollywood, who under date of December 17, wrote me that he appeared on KLAC-TELEVISION on Monday, December 5, on the "Eddie and Ev" show, and discussed at length the organic method and what it meant to civilization. He stated that there were so many phone calls from listeners and viewers who wanted more information on the organic method that following the program, the studio switchboard was stopped up. Eddie Marr (the Eddie of "Eddie and Ev") said it brought the biggest single response of any feature ever included in the program. He concluded, "Actually what I said was rather elementary, because I'm far from being an expert. But I believe I planted a few seeds—and perhaps killed a few sales for the soil killers."

CHEMICAL FERTILIZER BILL

Congressmen's House Resolution 207 to investigate the use of chemical fertilizers which was originally introduced in the last session of congress by Congressman Keefe of Wisconsin and which has been taken over by Congressman Sabbath of the Rules Committee, may come up for a vote in this session, if readers will write to their congressmen about it. It is the duty of every serious minded organiculturist to write to his congressman at once urging upon him the importance of having that bill rescued from the oblivion of the Rules Committee.

PROTEIN

Wheeler McMillen, editor-in-chief, in the June, 1949, issue of the *Farm Journal,* discusses the alarming reduction that is occurring in the protein percentage in corn. He says:

"The protein percentage in corn has gone down so much, I have heard several times lately, that all the protein from soybeans fails to make up the difference. It ain't so. True, the protein in corn has declined in forty years from about 10.3% to about 8.66%. Those percentages, if applied to the 1948 corn crop of 3,650,000,000 bushels, would indicate a difference of 2,787,000,000 pounds of protein. But the 220,200,000 bushels of soys in 1948, figured

at 37.5% protein, furnished 5,004,705,600 pounds of that valuable item, or more than two billion pounds more than last year's corn would have furnished at the 1910 percentage.

"But why is corn yielding less protein? We can not blame hybrid seed alone, because 'Feeds and Feeding' noted progressive declines in its 1923 and 1936 editions, before hybrid seed became generally used. Has the soil been losing what corn has to have to make protein? If so, what is missing? Wouldn't it be well to know?"

We know what the reason is. Will some of our readers write to Mr. McMillen and tell him. The address is:

Washington Square,
Philadelphia 5, Pennsylvania

CHEMICALS

Leonard O. Warner, Farm Editor of the Providence (R. I.) Journal in a recent issue of his paper describes a new method of preparing soil so that weeds will not grow in it. The new method was developed by Dr. Jesse A. DeFrance of Rhode Island State College Agricultural Experiment Station. You thoroughly mix into the soil granular calcium cyanamide at the rate of 75 pounds to 1,000 square feet in the upper 2 inches, or, spray on the seedbed a soluble phenyl mercury complex (10% strength) at the rate of two quarts to 1,000 square feet. Or, spray ammonium thiocyanate at the rate of two to four pounds to 1,000 square feet. Warner says, "Vegetable experiments, now under way, show that corn, radishes and spinach have germinated in soil treated with cyanamide, phenyl mercury and ammonium thiocyanate."

Yes, the vegetables will grow but what will the chemicals do to their nutritional content? Take the first item—calcium cyanamide. An ordinary application as a regular nitrogen fertilizer is about three or four hundred pounds per acre. In this case, 75 pounds per thousand square feet is equivalent to almost 4,000 pounds per acre, or ten times the usual amount. It is such a huge quantity and it so poisons the soil that weeds cannot grow in it. But if conditions are made right for the vegetable seeds they will grow. But what will happen to the bacteria, to the earthworm, to the mycorrhiza fungus that feeds the roots, or to the trace mineral element? I suggest to Dr. DeFrance that he feed two groups of mice one with vegetables raised in compost and the other in vegetables raised in his own chemicalized, weedless method. Then let us see what will happen to the mice.

This type of fragmentation in research makes one wonder what is going to happen to man if such a trend continues. What is meant by fragmentation in research? It means that the researchist is considering only a part or a fragment of his problem. Dr. DeFrance is concerned only with raising something that will pass for corn or spinach or a radish. His responsibility ends there. What happens to the person who eats these things is no concern of his. That is another department which the ethics of research forbids him to infringe upon. But the day must soon come when both of these departments will have to merge. Otherwise eventually every doctor will become an undertaker, too. Do you think I am too much of an alarmist in making statements like this? Well, brother, I don't think I am sufficiently scarifying. If you knew half the stuff which I dare not reveal, you would really have something to worry about. But I am satisfied that some progress is being made so I am containing myself for the while.

BETTER BREAD

I am glad to report a new scientific procedure which is an improvement from a health point of view. In storing flour, the moisture in it encourages bacteria and fungi to work and produce spoilage. Therefore all kinds of chemicals have been applied to such flour in storage to prevent its going bad. A new piece of equipment has been developed, illustrated and described in the Dec. 17, 1949 issue of the *Science News Letter*, which flash dries the flour so that about 14% of its moisture is eliminated. Thus the flour can be stored for long periods of time without spoiling. It is stated that the bread and cake made with such flash dried flour will taste better. The process was developed at the Industrial Research Institute, University of Denver. We need similar health-minded institutes at every scientific university in the U. S. It is the universities that should hold aloft a lamp of light to direct industry to go in paths of righteousness towards their fellowmen. This is an excellent trend. May it continue.

TRICHINOSIS IN PIG MEAT

Interesting fact: Garbage fed pigs have six times more trichinosis disease than those fed a regular farm-grown ration, which is another argument for a national program of municipal composting of all garbage.

TEETH

My youngest daughter, aged twelve, was at the dentist the other day, on account of a certain tooth which was not coming down out of the gum. It is wonderful what modern dentistry can do in such cases. By a little surgery and the wearing of a brace for a year or so, that tooth will be brought into its proper place

(*Continued on page 53*)

Vitamins from the Roadside

BY PAUL HADLEY
Photographs by the Author

Reprinted through courtesy of Frontiers, the magazine of the Academy of Natural Sciences, 19th Street and the Parkway, Philadelphia, Pa.

TO satisfy the normal spring craving for greens, the city dweller has but to go to the nearest market where he finds an ample supply of spinach, endive, escarolle, celery, lettuce and even dandelion. Modern marketing methods, plus rapid transportation facilities, have made it possible to get green leafy vegetables direct from the fields even in midwinter.

However, these market greens do not entirely satisfy the person who was reared in the country and to whom the greens mean the leaves of wild plants gathered from the fields and roadsides, cooked so deliciously that the dish was always empty before appetites were sated.

In rural sections spring always sees many housewives, basket on arm, in the fields and on the roadsides. By far the most popular of the wild greens is curly dock (*Rumex crispus*). This familiar plant is also known as sour dock and sometimes as yellow dock, on account of its yellow roots. Growing over most of the central and eastern United States, it is a familiar plant in low, wet pastures, shady orchards and along the edges of cultivated fields. Its strap-shaped leaves are to be found even in winter, making rosettes of green that lie flat upon the ground, waiting for the first warm days to start them growing for the new season. The name sour dock is given to the plant as a result of the slightly tart flavor; curly dock describes the appearance of the leaves, the edges being ruffled and curled.

—o—

The dock is the first of the wild greens to become of edible size, the rosettes having been formed the previous fall. The color is a rich, dark green; and that other creatures besides humans find them platable is evidenced by the number of insect-eaten holes which appear in the leaves, and by the insect eggs which are often found underneath.

It is necessary therefore to pick the leaves over carefully before cooking, but the flavor of the dock makes such extra care worth the effort. The dock is delicious alone or cooked with other greens. Later in the season, it shoots up, making a tall brushy seedhead that bears thousands of seeds for the propagation of the species. The flavor of dock resembles that of the spinach, to which family it belongs. There are other members of this family which resemble this dock, but which are not edible. These related plants may

Poke
(*Phytolacca decandra*)

Poke greens at their finest are the tender stalks that come up in the spring, to be cut and eaten like asparagus when a few inches high, always under a foot. The young leaves are flavorous, but it is the stalk that takes wise gatherers afield, in the moist little flood plains of creeks. This is the favorite greens of the South and much has been written about how to cook it.

Lamb's Quarters
(*Chenopodium album*)

Lambs-quarters is one of the best wild plants for the table and one of the most plentiful. It grows so many places and so profusely that it is known almost as well as the dandelion greens. The under side of the leaf has an attractive damp and frosty look.

Pepper grass
(*Lepidium virginicum*)

Nearly all greens must be cut and eaten while the plant is young. The coming of the new shoots when people are weary of winter diet is the thing that starts the saliva. Wild peppergrass is no exception to the rule of gathering small and tender for it gets tough with maturity. A common wayside plant, its value is not always understood.

be recognized by their leaves, in some species broader and with a tinge of red, and in others with a smooth surface. None but the curly dock has the ruffled edges.

Next in popularity probably is the pokeweed (*Phytolacca decandra*), which grows abundantly in the eastern and southern states. The source of the drug phytolaccin, it is a familiar plant along fence rows and in old clearings. Later than the dock, it grows to from four to six feet and when mature has clusters of white blossoms followed by dark berries from which a magenta-tinted juice can be pressed.

It is usually the latter part of April or in May that the pokeweed becomes of its greatest edibility, and in many places it is gathered and sold in city markets. The leaves are cooked as greens; the thick, fleshy stems can be treated as asparagus, and the entire plant remains edible for many weeks. The odd fact remains, however, that the roots are poisonous, and for this reason one should not cut too close to the ground. The pokeweed makes one of our best greens, however, but is usually cooked with other greens, as its flavor is enhanced by mixture. It is a wise precaution to boil twice, discarding the first water in order to get rid of any poisonous residue from the bark or root.

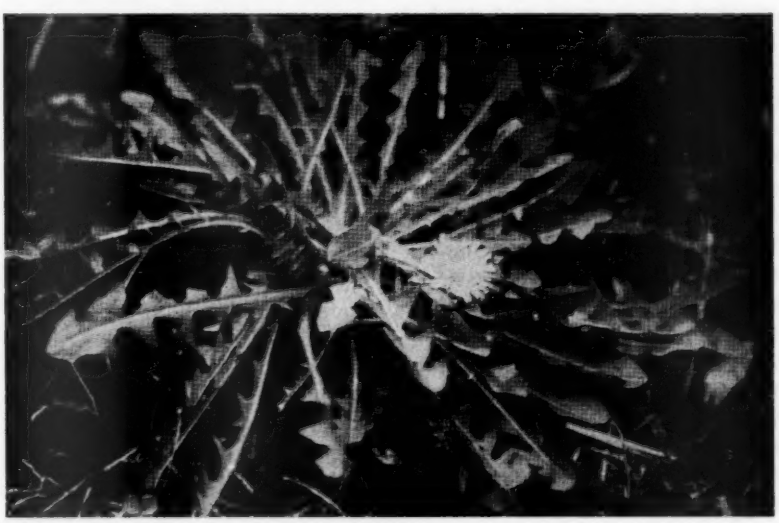
—o—

Wild lettuce, a favorite in many sections, is a member of the composite family, and is a relative of garden lettuce and of dandelion. The botanical name, *Lactuca,* was given from the milky appearance of the sap. The wild lettuce grows commonly along dry fence rows, and often is found bordering ditches. The appearance of the leaves is anything but lettuce-like, but its relationship to the familiar garden plant can be recognized by its odor and its milky sap. When grown, the plant may be four feet or more high; but this is small compared to the height of its relative, the sow thistle, which may reach eight feet, but is equally edible when young. The dandelion, of course, is well known; its leaves are not only edible but its roots also, which used to be roasted and eaten. The salsify, or vegetable oyster, and the chicory, are relatives.

Along smaller streams and creeks, and particularly along the streams flowing from cold springs, water cress may be found. This plant is used in both its raw state and when cooked as greens. It is a relative of the garden cress, and also of the mustard, the radish and cabbage, as well as of the wild peppergrass. It often chokes the small streams, and spreading rapidly, makes a solid growth of dark green with white flowers that completely hides the surface of the water. It may be used as a salad, mixed with onions or lettuce, and when used as a condiment in making sandwiches it has no peer. But in cooked form, it makes a delightful green, better when used in mixture with other leaves.

—o—

The wild peppergrass in appearance is not striking, and unless one is familiar with the plant, one may easily pass it by. But its peppery, pungent odor can never be mistaken. It is useful only when young and small, for it soon becomes tough and cannot be used. Later, its seeds are attractive to birds and poultry, and



The common dandelion is one of the favorite wild greens. Epicures enjoy the leaves blanched, chilled, and mixed with other things in the salad bowl. In the north temperate states it is the first green to invite the basket carriers.

Dandelion
(*Taraxacum officinale*)

children like to chew them for their hot, biting flavor. But, gathered while young, usually in mid-season for greens, the peppergrass makes a delightful adjunct to the leaves of the other wild plants.

In former days it was customary to cook greens several hours, but modern cookery experts advise cooking for only a short time, not over thirty minutes, This is long enough to reduce the fibers to softness, yet does not destroy the vitamins or the flavor as longer cooking does. Meat, usually salt pork, is cooked with greens to enhance the flavor, although this may not be necessary.

There are many other plants which are used as greens. The foreign markets of cities display green pumpkin vines and burdock plants; in some sections the wild ginger, the blackberry plant when young and tender; the plantain or rat-tail weed; the wild onion; the wood sorrel (that sour-flavored plant of our youth), and the young shoots of the ostrich fern are used. The fern is so highly thought of, that it is obtainable in canned form on some markets; but as the plant is widely spread, particularly in the east, it should not be necessary to resort to stores.

The leaves of the wild radish, the sweet potato, and many other plants are also edible. One of the familiar plants to most gardeners is the lambsquarters, which grows as a weed in most cultivated gardens. It has a triangular leaf, on the underside of which many small cells give a moist, frosty appearance. When young no other "weed" is more delicious.

—o—

Botanisits may be interested in knowing that one of their number, Dr. Milton Hopkins, who gave up teaching to become science editor for the publishing house of Henry Holt & Co., New York, in an enthusiast for greens for the table. According to Clemetine Paddleford, cookery expert of the New York *Hearld-Tribune*, Dr. Hopkins fares forth with his basket and blade to "collect" a dinner in the Long Island fields.

(*Continued on page* 54)

Increasing Gooseberries

By MRS. FLORENCE GUNN

I WANTED to tuck Pixwell gooseberry bushes into old corners around the fencerows to increase our fruit supply without taking much space. To get them, I bought two plants from a nursery and developed the others myself. The nursery directions were to cut the tops off before planting. I called the agricultural college and asked if these cut tops would grow like 'slips.' The college thought it not worth trying, but I dipped each slip into water that had 1 part honey to 20 parts water to make a rooting agent. Then the 'slips' were planted outdoors in the earth but each one was covered with an old glass tumbler and the bed was shaded with brush to keep off the hot rays of the sun. The bed was watched and carefully watered. The number of slips that grew into plants was gratifyingly large.

The plants from the nursery were pampered until the next spring. Then before growth started, each stem was cut off almost to the ground. Again the cut stems were treated as 'slips. The old plant sent up two new shoots for each one it had before. When the new shoots had begun to harden silghtly at the base, rich earth was mounded up around them. Each stem was slightly cut and treated with honey water to make rooting easier. In time roots grew all along the stems where they were covered with earth. They were allowed to stay a full year attached to the parent plant, but the next year, each rooted stem was cut off and started life as a separate plant. It is surprising how many places one can find to plant a couple of gooseberry bushes and never miss the space.

The Pixwells were selected because they hold their large fruit high above the thorns so that they are truly pixwell. The huge berries make fine jam and pies when green, but when fully ripe are a deep purple and are as tasty as any other fruit to eat out of hand.

Since all gooseberries are shallow rooted, the same as currants, they need mulching instead of cultivation.

BEGONIAS Throughout the Year

Fibrous Rooted Begonias Have Many Uses

By CHARLES APPLEGATE

Begonia semperflorens

ONE of my favorite plants and one that has been a favorite of mine for nearly all the years that I've been growing flowers, is the Begonia. This is a plant with many uses. I am referring to the fibrous rooted begonia, the *semperflorens* or "wax" type. These are really little gems among flowering plants. The leaves are a bright shiny green and some varieties are tinted on the stems and undersides of the leaves with various shades of red or bronze. The flowers are very deep red, with a number of shades of pink. The plants seldom reach one foot in height. They can be pinched back and kept low and still bloom heavily.

Fibrous-rooted begonias will grow in shade with just a few flecks of sunshine or in almost full sun. This makes them good as an edging where it is shady. They are good in a bed of mixed flowers. If left to themselves they will make rather large clumps and bloom all summer long. We use them as pot plants through the winter and as bedding or edging plants in the summer. In late August we plant two-inch cuttings in pots outside. They are started by the time of the first frost and can be brought inside. About two months after planting we have nice six-inch plants starting to bloom heavily. These plants continue blooming on into the winter. By mid-winter they are usually rather bushy though not very tall. We start quite a number of cuttings in March or April. They are well started to set out after danger of frost. Begonias add a touch of color to shaded portions of the rock garden, or among hardy plants.

Most fibrous-rooted begonias are single, but there are several double varieties. The doubles are particularly good in pots. The plants are short and stocky. The leaves are pure green. The flowers are made up of hundreds of petals packed together The blooms are ball-shaped and in clusters. They are up to an inch or slightly more in well grown plants. They are commonly known as "rose begonias" although they are far more double than any rose.

Semperflorens begonias need a very rich soil because they grow and bloom so much. It must contain a fairly large amount of humus. For potting begonias we use a mixture of black woods soil, compost, finely crumbled rotted leaves, and just a little sand. It must be kept in mind that begonias have very fine roots. The soil should be very loose so that they can penetrate it easily. After the plants fill the pots with roots they must be fed if flowering is to be kept up to the maximum. Weak liquid manure is good. It should not be used more than once a week on well established plants. Begonias

(*Continued on page* 54)

Making the Most of Small Garden Space . . . MRS. PE

Mrs. Petty's garden, which is about a hundred feet square, blooms continuously throughout the year. In December generous numbers of the Christmas rose (*Helleborus niger*) force their way up through the soil. Snow is essential for this beautiful winter-blooming plant. Twenty varieties of daffodil herald the coming of spring. There are also twelve varieties of tulip with tree peonies and other peonies of various kinds. Jacobean lilies border the beds and growing with them are primroses, twenty-two varieties of daylily, and a hardy begonia. Horticulture and flower arrangement have been combined in a most compatible manner.

Sempervivums have been used to soften the terrace stone wall. The large common variety is available all year round for bouquets. In the winter the leaves assume an attractive rusty red color. The small variety is the cobweb houseleek (*Sem-*

The cobweb houseleek growing on the treads of the stone steps add unusual points of interest. To the right of the steps are coral bells growing out of the terrace wall.

The lower step is faced with a bor sweet a and second steps are just ou

pervivum arachnoideum) and is used to soften the effect of the larger one. Its gray-green hairy leaves are joined by a lacy, silvery web. Also growing among the sempervivums are basket of gold, rock cress, kennelworth ivy and other compatible hardy perennial plants.

←

Terrace wall with *Sempervivum tectorum,* commonly called Hen-and-chickens shown in the upper left; *Sempervivum arachnoideum,* the cobweb houseleek in center and lower right; rock cress and basket of gold at center right; and kennelworth ivy literally covering the rocks at the lower left in the photograph.

a bor weet alyssum. Between the first
s are just out of bloom.

—CLEWELL

ROSE ARRANGEMENT OF 1900

The Gibson Girl Period

Buxom bouquets were the fashion at the beginning of the twentieth century. The flower arrangement reflected the women who made them, plump and handsome.

Placed on antique applewood table with a doiley of that period is a handsome arrangement of yellow-gloria and tallisman roses in a parian vase. The fashion was doilies and knickknacks. A matching parian box and a Staffershire trinket complete the setting.

The arangement is by Mrs. David M. Petty, accredited Judge of Flower Shows by the New York Federation of Garden Clubs and also an accredited Judge of Flower Shows by the National Council.

The New Organic Method

By J. I. RODALE

Continuing Discussion
SOME INTERESTING FACTS

IT IS about four months since we decided to follow the new method on our farm and in our gardens, and things look bright. Here is what we have done so far. After the growing season was over, about October, we began to place directly on the whole vegetable garden the same materials that we would have used in making compost. It was a mixture of ground up leaves, weeds, manure, ground up corn cobs, etc. Those materials, however, that were powders we put down first so that they would be in direct contact with the soil, that is the ground up limestone and phosphate rock. There would be no advantage in mixing them with the organic matter, because first, that would be additional labor and secondly it would take longer to get into the soil.

We piled the stuff about one foot high. Now it has become reduced to about two inches. Fortunately there has been much mild weather and even today, January 5th, it is unseasonally warm. Together with plentiful rains, wonderful things are happening. Much decay is going on, at the bottom of the stuff, where it is nice and moist. I have the secure feeling that all the liquids coming from the organic matter are leaching into the soil where the plants will grow, and not, going below the site of a compost heap where nothing is ever planted. And we did the work only once. Where we put the stuff, there it will remain. We do not have to move compost. Those who wish to continue making compost should make the heap in part of their vegetable garden, so that the liquid leachings will not be wasted.

The earthworms are multiplying prodigiously underneath this mulch. A bare cold ground is detrimental to their welfare. The condition is excellent also for the bacteria and fungi in the soil, etc. I do not expect all the matter to decay by spring and at this moment I do not know exactly what we will do. Shall we disc in the undecayed organic matter, or shall we push it aside a little and plant, using the stuff as part of the 1951 mulch. I am sure we are not going to plow. I would like to follow nature's method of leaving litter on the surface. When I can see what we have in the spring then a decision will be made.

But we are preparing for a year of mulching. Right now we have quite a few piles of leaves at the site of our vegetable garden which will be part of our compost mulch this coming season. They have been run through an ensilage cutter and shredded a great deal. It feels very fine as you run your hands though these soft piles which do not become as soggy as leaves that are piled without shredding.

Yes, this will be a year of compost mulching. As fast as the plants come up the mulching materials will be applied. No more tool cultivation that cuts the surface lateral roots of the vegetable plants to get rid of weeds, for there will be practically no weeding problem. An advantage of mulch gardening is that you can walk into your garden right after a rain as there is no mud to contend with.

One thing I like about this new method. And when I say "new" it is only new as far as our policy is concerned, for mulch gardening is an age-old practice. However, we have improved on the idea. Whereas the mulcher usually confined himself to straw, hay, leaves, etc., we are going further and providing for a balanced compost mixture, including ground up rocks, manure, dried blood if obtainable, and many other valuable ingredients. The one advantage I referred to is that by the new method you are surer to provide sufficient raw organic matter. In making compost you may not make enough. Or you may apply it too heavily in one place and not have any left for another.

As I look about me I see every flower bed, every fruit tree, every place that we are cultivating with a heavy coating of organic matter. I know that in past years some of our flower beds were neglected because we realized that the food crops needed it the most to give us vitamins and we became miserly when it came to roses and geraniums. I remember once saying, when I was asked what to do, "You don't eat flowers." But now that question will not arise again, for somehow or other there seems to be no dearth of organic matter, and this year we are therefore applying twice as much organic matter to our soil as last year. When a man makes compost and he is throwing stuff up four or five feet with a pitch-fork, and three or four hours of such work is done, it is peculiar how his ability to judge a situation is affected. When he is thus fatigued he might say, "I think we have enough," whereas if he was not tired his judgment would tell him to keep on applying the stuff. This is a good point to consider—in the old way, heavy stuff has to be lifted four or five feet. In the new method it is all applied to the ground.

I strongly urge the incoming, new readers of this magazine to begin with the mulching method immedi-

ately, but if possible try and get some dried blood to mix in the upper three inches of soil because much of its nutrients are immediately available. These newcomers should apply some Activo or BCA (advertised in this magazine) as a starter. To those who are practicing the Bio-dynamic method, using solutions made from the extracts of weeds, find out from the source that you have obtained the solutions, how they may be used in the new method. With regard to garbage, do not use that as a mulch. That should be composted separately, and I suggest the new method of composting, that is, with a cement bottom and some kind of covering.

CORRESPONDENCE

Here is a letter that is interesting:

I am going to try the new way you mention, in fact I have done so in a limited way. Away back in the summer I took chicken house litter and spread it on the ground about 1 inch deep and left it like that, having rototilled it first. I planted strawberries there this fall and you could see the difference between that soil and that which didn't get that treatment.

Another idea is that of buying up spoiled hay and running it through my cutting box and spreading it along my rows. This year it was clover hay and I had a clover patch as the seed germinated and grew. I let it grow as I thought the clover might add nitrogen to the soil. Everything thrived so the clover helped if anything. My sweet Spanish onions were terrific. Everyone was amazed at them.

Ernest Watson
Chardon, Ohio

In regard to the first paragraph of this letter, it is important that the litter be left to decay about three months before planting the strawberries.

ANOTHER MULCHER

Here is another letter which shows what is being done in the line of mulching:

As to the use of mulch, since May 1948 we have used aproximately 20 tons of old hay and new hay for mulching purposes, which includes several tons of stable litter and manure in various stages of ripeness, which had to be worked in.

The current issue of *O.G.* tells of circumventing the compost pile by taking the components direct to the soil. This is what we have had to do here, of sheer necessity. The entire garden and orchard areas had been allowed to run to weeds for years. It was uncultivated for years. Berry brambles all over the place. We had to open it up; clean up the weeds; eliminate brambles; build up the soil, hold it fast by heavy mulching, and make it produce a crop. Maybe you think we haven't worked! And used our imagination! Everywhere we look, there is a story.

In addition to all the material for mulching, a truck of 8 tons capacity was filled to the brim with corncobs, and brought in to the gardens. We have just finished the job of spreading it, tilling it in certain spots, and allowing it to remain on top as a mulch in other spots.

Chester A. Creider,
Excelsior Springs, Md.

FROM A RELIGIOUS TRACT

Enclosed is an excerpt from a tiny booklet received in the mail issued by Christian Service, Phila. 15, Pa. which is extremely pertinent to our discussion:

One of the first principles is that nature never leaves any ground bare. If man makes it bare, nature covers it with weeds. One of the greatest crimes against nature man is guilty of, and for which he has suffered much, is that of making the ground bare and leaving it bare for long periods. Weeds are among the best friends the plant grower has. When soil is left bare the sun, wind, and rain rapidly leach out and carry away the fertility and much of the soil itself. In our selfish greed we take off from the soil everything we can use to satisfy our lusts and leave the soil bare. Soil left bare becomes hard and the food elements insoluble. On the other hand, soil kept covered, even with boards or stones, or any other material, becomes mellow and the plant food soluble, so that the roots of the plant can absorb it.

Man has destroyed the vegetation of the western plains and the wind has blown the soil away. They reaped what they sowed. Any piece of ground that is left bare will lose some of its best soil in a wind storm. The present use of the land in this country will certainly bring on a famine, and we do not believe the time is very far distant.

In tilling the soil it is of course necessary to have it bare for short periods, but some form of plant life or other substance should cover it as quickly as possible. My father observed, when I was a boy, that the neighbors who had the best gardens

Schedule of Spring Flower Shows

DATE	SHOW	PLACE
Feb. 24-27	International Orchid Show, Municipal Auditorium	Miami, Fla.
Mar. 5-7	American Carnation Society Show, Hotel Schroeder	Milwaukee, Wis.
Mar. 5-12	Home and Flower Show, Public Auditorium	Cleveland, O.
Mar. 12-18	New England Spring Flower Show, Mechanics Building	Boston, Mass.
Mar. 20-25	Philadelphia Flower Show, Commercial Museum	Philadelphia, Pa.
Mar. 20-25	International Flower Show, Grand Central Palace	New York, N. Y.
Mar. 23-29	National Flower Show, National Guard Armory	Washington, D. C.
Mar. 25-Apr. 2	Michigan Flower and Garden Exhibit, Convention Hall	Detroit, Mich.

were those who allowed the weeds to cover them in the fall. But he did not profit by his observation for he always kept his garden free from weeds. The result was that he spent a great deal of time and money on that garden and never had a really good one. Far better let nature cover the soil with weeds than to leave it bare. When we have taken a crop from the soil, and do not intend to plant another soon, we sow a cover crop or cover it lightly with organic matter, hay, straw, weeds, leaves. Buckwheat is a good cover crop but it should not be allowed to grow long enough to ripen as it will be troublesome as a weed. Oats are also very good particularly for late planting as they will grow even after light frosts and die before spring. They do not reseed the next year like buckwheat. Wheat and rye are used much as cover crops, but we do not like them for the reason that they live over winter and are hard to dispose of in the spring. A cover that does not live over winter is best for the garden.

Compost heaps are widely recommended, but nature does not make compost heaps. Much of the value of the organic matter is lost in this way, carried off by wind and water. The best place to decompose organic matter is in or on the soil where you want it. For gardens this can be done by spreading the matter on part of the garden while the other part is being used, or placing it around plants and between rows. Let part of your garden be a compost plat while you use the other part. The land needs rests just as you do. God's law for Israel was to let the land rest every seventh year, and because they did not do it He drove them out of the land that she might enjoy her sabbaths. If you profess to be a child of God better sit up and take notice. Where one has only a small garden the compost heap may be admissible, but where possible the organic material should be allowed to decay on, or in, the soil. Making and caring for a compost heap is too expensive to be practical when other more natural methods can be used. Compost is good but you cannot improve on God's way of making it.

Composting materials are added to the soil.

Organic matter left on top of the soil may be coarse without having any ill effects, but if it is to be incorporated with the soil it should be sufficiently decayed to be finely pulverized; otherwise it may keep the soil too porous and cause the loss of moisture. TOO MUCH humus will do this even when finely pulverized. Examine the soil in a woodland. On the top you find coarse leaves. Next you find partly decayed leaves and then pulverized leaves mixed with soil. Let nature teach you. Did you ever see a forest turning the soil upside-down and putting the leaves under? This is not a popular way of gardening, but did you ever hear of any of God's ways being popular? And did you ever hear of anyone going contrary to God's ways and not paying the penalty?

Most of the so-called improvements man has made in varieties of plants have been to his own destruction. Larger yield and finer appearance is the purpose. But in order to get this he must sacrifice quality. That does not matter, however, as what he wants is something to turn into money, the root of all kinds of evil. He has succeeded in producing more starch, and more protein, and sometimes more fat, but in doing so he has sacrificed the vital elements. He has also succeeded in producing more fruit for the hospitals, the asylums and the penal institutions. Man never picked up anything that God made, that he did not spoil it.

For the perennial trees and plants one does not need to till the soil, but may keep it covered year after year with humus. This keeps down the weeds, holds the moisture and provides an ideal soil for good growth. This is nature's way of growing nearly all her plants. We have a plant of the Sedum family that makes a good covering for soil under trees. It is often grown in flower gardens for a border. It grows very profusely, about a foot high, and will kill out almost all annuals and many other difficult weeds like honeysuckle and poison ivy. Its roots spread under the soil and send up new shoots, widening its area about two or three feet each year. It makes a very desirable covering for the ground, remaining at about the same height all summer. It apparently has no seed and does not spread over wide areas. It is excellent for banks to prevent erosion and where it is difficult to mow the weeds. It never needs to be mowed. We know of no plant that is a more desirable covering with so little expense. We have had 15 years experience with it and it has not shown any undesirable qualities. It leaves the soil so loose and filled with humus that earthworms inhabit it

in great numbers, and grow to enormous size. This is very important as earthworms are among the gardener's best friends. The earthworm eats dirt and digests it, dissolving plant food in its system.

ANOTHER LETTER

Here is another mulching letter, in the form of a memorandum:

THE CITY GARDENER

In the December issue of *Organic Gardening*, Mr. Rodale, in recommending his new method of organic fertilizing, requested information concerning such procedure in the past.

On the average city lot, there is not sufficient dirt to build a compost pile without leaving a hole here and there, so it was decided to use the sheet system. Two implements are especially necessary, a wheel-barrow, and a roto-tiller.

In the Spring and Summer, you will hear a lawn mower in the mornings and evenings. That is the signal. Grab the wheel-barrow and rush down to the neighbor who is cutting grass. After explaining what and why the grass clippings are wanted, naturally the conversation will develop in various discussions. That wheel-barrow has been instrumental in developing the most wonderful friendships in the neighborhood that would otherwise consist of total strangers.

The grass clippings are used for mulching. Remember there is a wheel-barrow or two coming in every other day and it soon amounts to quite a quantity. After the beets are lifted, then the roto-tiller places the mulch into the soil. A mixture of phosphorus and sheep manure is then sowed, broadcast by hand and worked into the soil. Thereafter, that particular plot is forgotten. Later when the onions, beans, tomatoes, etc. are lifted, the same procedure is followed.

In the autumn, the leaves begin to fall. About a half mile distance, there is a golf course. The leaves are gathered and stacked. The Superintendent was given my telephone number and requested to telephone me instead of burning the leaves. The leaves go through the same process as the grass clippings. Then the rains come, and the sun shines. The garden plot is not disturbed until spring planting when all that is done is to make a row and plant the seeds. What is the cost? The cost of things is usually weighed by the benefit enjoyed. We have the most wonderful flavored vegetables, no doctor bills, and we feel wonderful.

Henry Harper,
Irving, Texas

A REFORMED COMPOSTER

Here is still another letter that shows which way the wind is blowing:

Dear Mr. Rodale:

The 'new' organic method described in December *Organic Gardening* looks suspiciously like the method nature has been using for a few million years.

For years I have been making compost and spading it in, also spading under large quantities of various kinds of stable manure. This method did finally enrich the soil and increase its productivity, which was virtually nil in the beginning. Limited time and strength prevented my making anywhere near the required amount of compost. This year for the first time I mulched half my tomatoes with a couple inches of finished compost topped by coarse compost, straw and weeds. I intended to compare mulched with unmulched results but was soon lost in an avalanche of tomatoes and had all I could do to pick and use or give them away. Six dozen plants were set and cut worms destroyed about a dozen, a record for me. Large green tomato worms were hand picked by the score—also a record. Then blister beetles appeared and the only reason I did not dust or spray was the complete failure of these measures in 1948 when blister beetles destroyed my entire crop of tomatoes. The beetles increased for a time and ate some of the lower leaves. If they hadn't it would have been difficult to find some of the fruit. Plants were set 5 feet apart each way and the mulched ones crossed the rows and grew very thick. What happened to the beetles I don't know. A covey of quail spent the summer in or near my garden and if quail eat blister beetles they probably did. The beetles never became plentiful enough to do any damage. In the fall I planted a patch of wheat to encourage the quail next year. The advantage of mulching was clearly apparent to even a casual observer, scrawny vines and small tomatoes on the unmulched half. Varieties planted were Jubilee, a superlative bright yellow and Burpee's Big Boy hybrid, the finest flavored tomato I have ever tasted.

In addition to being apparently just what the doctor ordered, mulch can be applied at any time, during the growing season and all winter. The mad spring rush to do everything in too little time can be greatly relieved. I have unlimited garden space (7 acres) and unlimited amounts of organic matter—manure, cobs and green growth from a swampy area—but limited time has kept my garden rather small. This year I picked 51 watermelons—15-29 lbs.—from six hills. More than a dozen were still growing when frost came. Black raspberries and strawberries make me dizzy the way they grow. Two small white peach trees made a tremendous growth during the summer. I am definitely sold on mulching. Let the weather and the earthworms make the compost.

Margaret Joos,
Morris, Ill.

THE JAPANESE ENZACTIVATOR

The following letter asks a question about the Japanese Enzactivator which we described in the December, 1949 issue of *Organic Gardening*:

Dear Mr. Rodale:

Your December issue promises

(*Continued on page 55*)

When and How to Plant Your Vegetables

By WILLIAM H. EYSTER, Ph.D.

AS SOON as the seeds for your vegetable garden have been received, group them into classes according to hardiness and temperature requirements. A rough grouping of this kind is given in the classification below:

Cold-hardy plants for early-spring planting		Cold-tender or heat-hardy plants for late-spring or early-summer planting			Hardy plants for late-summer or fall planting except in the North (plant 6 to 8 weeks before first fall freeze)
Very hardy (plant 4 to 6 weeks before frost-free date)	Hardy (plant 2 to 4 weeks before frost-free date)	Not cold-hardy (plant on frost-free date)	Requiring hot weather (plant 1 week or more after frost-free date)	Medium heat tolerant (good for summer planting)	
Broccoli	Beets	Beans, snap	Beans, lima	Beans, all	Beets
Cabbage	Carrots	Cucumbers	Eggplant	Chard	Collards
Lettuce	Chard	Okra	Peppers	Soybeans	Kale
Onions	Mustard	New Zealand spinach	Sweet potatoes	New Zealand spinach	Lettuce
Peas	Parsnips	Soybeans		Squash	Mustard
Potatoes	Radishes	Squash		Sweet corn	Spinach
Spinach		Sweet Corn			Turnips
Turnips		Tomatoes			

The gardener naturally wants to make the first planting of each vegetable as early as he safely can, without too much danger of its being damaged by cold. Many vegetables are so hardy to cold that they can be planted a month or more before the average date of the last freeze, or about 6 weeks before the frost-free date in a particular region. It should be remembered, in this connection, that most cold-tolerant crops actually thrive better in cool than in hot weather and should not be planted in spring in the southern two-thirds of the country where hot summers occur. Thus, the gardener must time his planting not only to escape cold but with certain vegetables also to escape heat. Some vegetables that will not thrive when planted in late spring in areas having rather hot summers may be sown in late summer, however, so that they will make most of their growth in the cooler weather of autumn.

Time of Planting

One of the most important factors is the planting or transplanting of each crop at the time or times that are best in any particular locality. A gardener anywhere in the United States can determine his own safe planting dates for different crops by using the spring frost map giving the average dates of the last killing frost in the United States and the Fall Frost Map giving the average dates of the first killing frosts in autumn together with the data given in tables 1 and 2.

Spring Planting Dates. To determine the best time to plant any particular vegetable in your locality in spring, proceed as follows:

1. Find your location on the map on page 39.

2. Find the solid line (called an *isotherm*) on this map that comes nearest your locality.

3. The date shown on this line is the average date of the last killing frost (3-10, for instance means 3rd month and 10th day or March 10; 4-15 means April 15th, etc.)

4. Turn to table 1 on pages 40 and 41 and find the column having this date as a heading. Mark this column as it is the only one that you will use in your locality for determining spring planting dates.

5. Find the dates in this column opposite the crop you wish to plant. These dates show the period during which this crop can be planted for best results, but the earlier in this period the planting is made the better.

Late Planting Dates. Plantings for fall crops must be made at such times that the crop has sufficient time to mature before the first killing frost in autumn. The latest safe planting dates as well as range of planting dates can be determined by making use of the map on page 44 and table 2 on pages 42 and 43.

1. Find the approximate location on map 2, page 44.

2. Find the solid line on this map that comes nearest your locality.

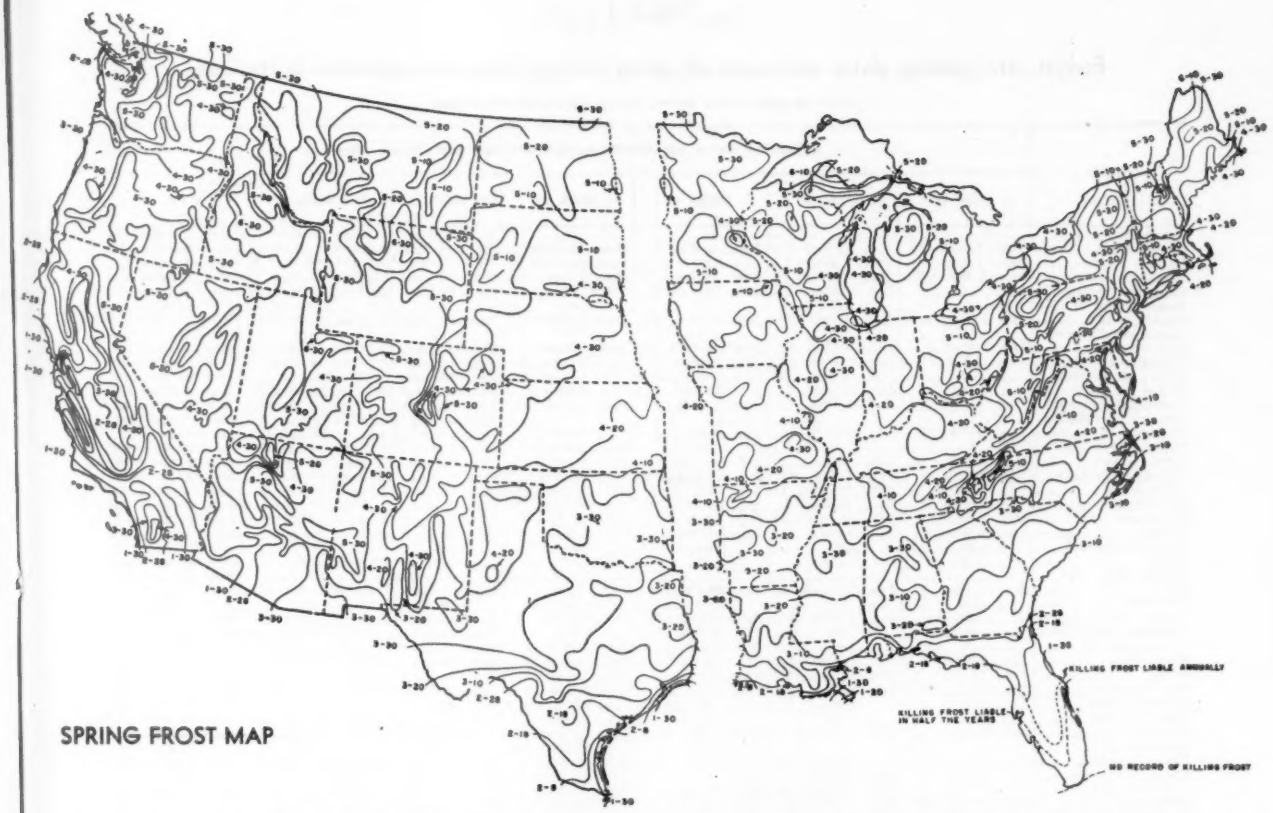
3. The date shown on this line is the average date of the first killing frost in autumn.

4. Turn to table 2 on pages 42 and 43 and find the column having this date as a heading. Mark this column as it is the only one you will use for determining the latest safe planting date in your locality.

5. Find the dates in this column opposite the crop you wish to plant. These dates indicate the period during which plantings may be made in the open.

How to Plant Seeds

Many gardeners, and especially those who have had limited or no experience, plant seeds too thickly and cover them too deeply. It may



SPRING FROST MAP

Average dates of the last killing spring frosts in the United States, 1899 to 1938. Gardeners should locate the line nearest to the locality in which they live, note the date on that line (the first figure indicates the month, the second the day; thus, 3-10 is March 10), and then refer to Table 1. This map and the table are most useful in the absence of local information.

be assumed that at least 75 per cent of the seeds sown will germinate. Accordingly, the seeds should be spaced so that the seedling and ultimately the growing plant will have sufficient space to grow into a normal, healthy plant. Some seeds, as beets for instance, occur in clumps of several seeds and need to be scattered more widely than other seeds. As regards depth of planting, a good rule to follow is to cover a particular kind of seed with a layer of soil about three times the thickness of the seed. For example, a pea seed which has a diameter of ¼ inch should be covered with ¾ of an inch of soil while radish seeds which are hardly more than 1/16 of an inch in diameter should be covered with a layer of soil only about 3/16 of an inch in thickness.

The space between the rows should vary according to the size of the vegetables grown. For small vegetables as radishes and leaf lettuce a spacing of 12 inches between the rows is sufficient, while the larger plants must be more widely spaced.

Before planting time has arrived, the gardener should make a careful plan of the garden giving the paths and the location of each row of vegetable to be planted.

The proper preparation of the soil for planting is extremely important. The soil should not be worked when too wet. Dig the soil as little as necessary but work into the top two or three inches as much well-fermented compost as you can afford or as much as is necessary to make the soil soft and friable. It would be well also to add finely pulverized phosphate rock or other rock containing the trace elements which might have been leached out of your soil.

Plants for Transplanting

Some vegetables as cabbage, head lettuce, celery, tomato, pepper, eggplant, and Bermuda onions are started indoors or in hotbeds and transplanted to the garden later as seedlings. While many of these seedlings can be purchased from commercial growers, many gardeners prefer to grow their own seedlings. By so doing they can be sure of having the variety they really want. Also they can grow them in composted soil and thus be sure of healthy, vigorous seedlings. Such seedlings are more apt to grow into healthy plants in the garden later.

A good soil mixture for germinating the seeds consists of equal parts of sand and compost or leafmold. These materials should be provided in the fall to make sure that they will be available in February and March when needed for sowing the seeds indoors. Mix the sand and compost thoroughly and then put it through a fine screen. The coarse material which does not go through the screen may be put in the

TABLE I

Earliest safe planting dates and range of spring-planting dates for vegetables in the open

(Average frost dates shown in the accompanying maps)

CROP	Planting dates for localities with average last freeze on—						
	JAN. 30	FEB. 8	FEB. 18	FEB. 28	MAR. 10	MAR. 20	MAR. 30
Asparagus (1)	.....	.....	.....	.....	Jan. 1-Mar. 1..	Feb. 1-Mar. 10.	Feb. 15-Mar. 20
Beans, lima	Feb. 1-Apr. 15.	Feb. 10-May 1..	Mar. 1-May 1..	Mar. 15-June 1.	Mar. 20-June 1.	Apr. 1-June 15.	Apr. 15-June 20
Beans, snap	Feb. 1-Apr. 1..	Feb. 1-May 1..	.....do.....	Mar. 10-May 15.	Mar. 15-May 15.	Mar. 15-May 25.	Apr. 1-June 1
Beets	Jan. 1-Mar. 15.	Jan. 10-Mar. 15.	Jan. 20-Apr. 1.	Feb. 1-Apr. 15.	Feb. 15-June 1.	Feb. 15-May 15.	Mar. 1-June 1
Broccoli, spr'tg (1)	Jan. 1-30.....	Jan. 1-30.....	Jan. 15-Feb. 15.	Feb. 1-Mar. 1..	Feb. 15-Mar. 15.	Feb. 15-Mar. 15.	Mar. 1-20
Brussels spr'ts (1)	.....do.....	.....do.....	.....do.....	.....do.....	.....do.....	.....do.....	Do.
Cabbage (1)	Jan. 1-15.....	Jan. 1-Feb. 10.	Jan. 1-Feb. 25.	Jan. 15-Feb. 25.	Jan. 25-Mar. 1.	Feb. 1-Mar. 1..	Feb. 15-Mar. 10
Cabbage, Chinese	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Carrots	Jan. 1-Mar. 1...	Jan. 1-Mar. 1..	Jan. 15-Mar. 1.	Feb. 1-Mar. 1..	Feb. 10-Mar. 15.	Feb. 15-Mar. 20	Mar. 1-April 10
Cauliflower (1)	Jan. 1-Feb. 1..	Jan. 1-Feb. 1..	Jan. 10-Feb. 10.	Jan. 20-Feb. 20.	Feb. 1-Mar. 1..	Feb. 10-Mar. 10	Feb. 20-Mar. 20
Celery & celeriac	.....do.....	Jan. 10-Feb. 10.	Jan. 20-Feb. 20.	Feb. 1-Mar. 1..	Feb. 20-Mar. 20	Mar. 1-Apr. 1..	Mar. 15-Apr. 15
Chard	Jan. 1-Apr. 1..	Jan. 10-Apr. 1..	Jan. 20-Apr. 15.	Feb. 1-May 1..	Feb. 15-May 15.	Feb. 20-May 15.	Mar. 1-May 25
Chervil & chives	Jan. 1-Feb. 1..	Jan. 1-Feb. 1..	Jan. 1-Feb. 1..	Jan. 15-Feb. 15.	Feb. 1_Mar. 1..	Feb. 10-Mar. 10.	Feb. 15-Mar. 15
Chicory, witloof	.....	.....	.....	.....	June 1-July 1..	June 1-July 1..	June 1-July 1
Collards (1)	Jan. 1-Feb. 15..	Jan. 1-Feb. 15.	Jan. 1-Mar. 15.	Jan. 15-Mar. 15.	Feb. 1-Apr. 1..	Feb. 15-May 1..	Mar. 1-June 1
Corn salad	.....do.....	.....do.....	.....do.....	Jan. 1-Mar. 1..	Jan. 1-Mar. 15.	Jan. 1-Mar. 15.	Jan. 15-Mar. 15
Corn, sweet	Feb. 1-Mar. 15.	Feb. 10-Apr. 1.	Feb. 20-Apr. 15.	Mar. 1-Apr. 15.	Mar. 10_Apr. 15.	Mar. 15-May 1.	Mar. 25-May 15
Cress, upland	Jan. 1-Feb. 1..	Jan. 1-Feb. 15.	Jan. 15-Feb. 15.	Feb. 1_Mar. 1..	Feb. 10-Mar. 15.	Feb. 20-Mar. 15.	Mar. 1-Apr. 1
Cucumbers	Feb. 15-Mar. 15.	Feb. 15-Apr. 1.	Feb. 15-Apr. 15.	Mar. 1-Apr. 15.	Mar. 15-Apr. 15.	Apr. 1-May 1.	Apr. 10-May 15
Dandelion	Jan. 1-Feb. 1..	Jan. 1-Feb. 1..	Jan. 15-Feb. 15.	Jan. 15-Mar. 1.	Feb. 1-Mar. 1.	Feb. 10-Mar. 10	Feb. 20-Mar. 20
Eggplant (1)	Feb. 1-Mar. 1..	Feb. 10-Mar. 15	Feb. 20-Apr. 1.	Mar. 10-Apr. 15.	Mar. 15-Apr. 15.	Apr. 1-May 1...	Apr. 15-May 15
Endive	Jan. 1-Mar. 1..	Jan. 1-Mar. 1..	Jan. 15-Mar. 1.	Feb. 1_Mar. 1..	Feb. 15-Mar. 15.	Mar. 1_Apr. 1..	Mar. 10-Apr. 10
Florence fennel	.....do.....	.....do.....	.....do.....	.....do.....	.....do.....	.....do.....	.....do.....
Garlic	(2)	(2)	(2)	(2)	(2)	Feb. 1-Mar. 1..	Feb. 10-Mar. 10
Horseradish (1)	.....	.....	.....	.....	.....	.....	Mar. 1-Apr. 1
Kale	Jan. 1-Feb. 1..	Jan. 10-Feb. 1.	Jan. 20-Feb. 10.	Feb. 1-20.....	Feb. 10-Mar. 1.	Feb. 20-Mar. 10.	Mar. 1-20
Kohlrabi	.....do.....	.....do.....	.....do.....	.....do.....	.....do.....	.....do.....	Mar. 1-Apr. 1
Leeks	.....do.....	Jan. 1-Feb. 1..	Jan. 1_Feb. 15.	Jan. 15-Feb. 15.	Jan. 25-Mar. 1.	Feb. 1_Mar. 1..	Feb. 15-Mar. 15
Lettuce, head (1)	.....do.....	.....do.....	Jan. 1-Feb. 1..	.....do.....	Feb. 1-20.....	Feb. 15-Mar. 10.	Mar. 1_20
Lettuce, leaf	.....do.....	.....do.....	Jan. 1-Mar. 15.	Jan. 1-Mar. 15.	Jan. 15-Apr. 1.	Feb. 1-Apr. 1..	Feb. 15-Apr. 15
Mustard	Jan. 1-Mar. 1..	Jan. 1_Mar. 1..	.....do.....	Feb. 1-Mar. 1..	Feb. 10-Mar. 15.	Feb. 20_Apr. 1.	Mar. 1-Apr. 15
Okra	Feb. 15-Apr. 1.	Feb. 15_Apr. 15.	Mar. 1-June 1..	Mar. 10-June 1.	Mar. 20-June 1	Apr. 1-June 15.	Apr. 10-June 15
Onions (1)	Jan. 1-15...?...	Jan. 1-15.....	Jan. 1-15.....	Jan. 1-Feb. 1..	Jan. 15-Feb. 15.	Feb. 10-Mar. 10	Feb. 15_Mar. 15
Onions, seed	.....do.....	.....do.....	.....do.....	Jan. 1-Feb. 15..	Feb. 1-Mar. 1..	.....do.....	Feb. 20-Mar. 15
Onions, sets	.....do.....	.....do.....	.....do.....	Jan. 1-Mar. 1..	Jan. 15-Mar. 10.	Feb. 1-Mar. 20.	Feb. 15-Mar. 20
Parsley	Jan. 1-30.....	Jan. 1-30.....	Jan. 1-30.....	Jan. 15-Mar. 1.	Feb. 1-Mar. 10.	Feb. 15-Mar. 15.	Mar. 1-Apr. 1
Parsnips	.....	.....	Jan. 1-Feb. 1..	Jan. 15-Feb. 15.	Jan. 15_Mar. 1.	.....do.....	Do.
Peas, garden	Jan. 1_Feb. 15.	Jan. 1-Feb. 15.	Jan. 1-Mar. 1..	Jan. 15-Mar. 1.	Jan. 15-Mar. 15	Feb. 1-Mar. 15.	Feb. 10-Mar. 20
Peas, black-eye	Feb. 15_May 1..	Feb. 15-May 15.	Mar. 1-June 15.	Mar. 10-June 20	Mar. 15-July 1.	Apr. 1-July 1...	Apr. 15-July 1
Peppers (1)	Feb. 1-Apr. 1..	Feb. 15-Apr. 15.	Mar. 1-May 1..	Mar. 15-May 1.	Apr. 1-June 1..	Apr. 10-June 1.	Apr. 15-June 1
Potatoes	Jan. 1-Feb. 15..	Jan. 1-Feb. 15.	Jan. 15-Mar. 1.	Jan. 15-Mar. 1.	Feb. 1_Mar. 1..	Feb. 10-Mar. 15	Feb. 20-Mar. 20
Radishes	Jan. 1-Apr. 1..	Jan. 1-Apr. 1..	Jan. 1-Apr. 1..	Jan. 1-Apr. 1...	Jan. 1-Apr. 15.	Jan. 20-May 1..	Feb. 15-May 1
Rhubarb (1)	.....	.....	.....	.....	.....	.....	.....
Rutabagas	.....	.....	.....	Jan. 1_Feb. 1..	Jan. 15-Feb. 15.	Jan. 15-Mar. 1.	Feb. 1-Mar. 1
Salsify	Jan. 1-Feb. 1..	Jan. 10-Feb. 10.	Jan. 15-Feb.. 20.	Jan. 15-Mar. 1.	Feb. 1-Mar. 1..	Feb. 15-Mar. 1.	Mar. 1-15
Shallots	.....do.....	Jan. 1-Feb. 10..	Jan. 1-Feb. 20.	Jan. 1-Mar. 1..	Jan. 15-Mar. 1.	Feb. 1-Mar. 10.	Feb. 15-Mar. 15
Sorrel	Jan. 1-Mar. 1..	Jan. 1-Mar. 1..	Jan. 15-Mar. 1.	Feb. 1_Mar. 10.	Feb. 10-Mar. 15.	Feb. 10-Mar. 20.	Feb. 20-Apr. 1
Soybeans	Mar. 1-June 30.	Mar. 1-June 30.	Mar. 10-June 30.	Mar. 20-June 30.	Apr. 10-June 30	Apr. 10-June 30	Apr. 20-June 30
Spinach	Jan. 1-Feb. 15..	.....do.....	Jan. 1-Mar. 1..	Jan. 1-Mar. 1..	Jan. 15-Mar. 10.	Jan. 15_Mar. 15	Feb. 1-Mar. 20
Spinach, N. Z'land	Feb. 1-Apr. 15.	Feb. 15-Apr. 15.	Mar. 1_Apr. 15.	Mar. 15-May 15.	Mar. 20-May 15.	Apr. 1-May 15.	Apr. 10_June 1
Squash, summer	.....do.....	.....do.....	.....do.....	.....do.....	Mar. 15-May 1.	.....do.....	Do.
Sweetpotatoes (1)	Feb. 15-May 15.	Mar. 1-May 15.	Mar. 20-June 1.	Mar. 20-June 1.	Apr. 1-June 1..	Apr. 10-June 1.	Apr. 20-June 1
Tomatoes (1)	Feb. 1-Apr. 1..	Feb. 20-Apr. 10.	Mar. 1-Apr. 20.	Mar. 10-May 1.	Mar. 20-May 10.	Apr. 1-May 20.	Apr. 10-June 1
Turnips	Jan. 1-Mar. 1..	Jan. 1-Mar. 1..	Jan. 10-Mar. 1.	Jan. 20-Mar. 1.	Feb. 1-Mar. 1..	Feb. 10_Mar. 10	Feb. 20-Mar. 20

(1) Plants (2) Planted in fall only.

bottom of the pot, flat, or other container used. This will insure good drainage. Do not sterilize this soil mixture and do not add artificial chemical fertilizers of any kind. The sand-compost mixture will provide you with healthy seedlings having well-developed root systems.

Fill the container to the top and level it off with a piece of board. Mark the rows about 2 inches apart and about ¼ inch deep for most garden seeds. The rate of seeding should be from 10 to 12 seeds for each inch of row. To cover the seeds, fill a small flower pot with dry sand which will flow through the hole in the bottom of the pot. The rate of flow can be regulated by placing one of your fingers over a part of the hole. After the seeds are covered with sand, tamp the sand and soil with a flat board and water with a sprinkling can fitted with a nozzle to convert the water into a fine spray. Water repeatedly until the soil is well soaked. Now cover the container with a piece of glass which will prevent drying out and hasten germination.

The seedlings should be transplanted just as soon as the first mature leaves appear. The first leaflike structures which appear on most seedlings are the cotyledons which were already formed in the seed. In removing seedlings for transplanting, care must be taken that the roots are not injured. This may be accomplished by loosening the soil in the seed flat or pot with a pointed stick (dibble).

A good soil mixture consists of one part sand, one part compost or leafmold, and two parts of good garden soil. Fill the flat or other container and tamp the soil firmly. To set the seedlings, make a hole in the soil mixture with your finger or a pointed stick. Spread the roots tenderly, cover them with the soil, and firm the soil over the roots and around the stem. The seedlings should be set about 2 inches apart each way. The newly transplanted seedlings should be watered to make sure that the soil is well settled around the roots.

The seedlings should be kept in bright light but the temperature

Table I (continued)

Earliest safe planting dates and range of spring-planting dates for vegetables in the open

(Average frost dates shown in the accompanying maps)

CROP	Planting dates for localities with average last freeze on—						
	APR. 10	APR. 20	APR. 30	MAY 10	MAY 20	MAY 30	JUNE 10
Asparagus (1)	Mar. 10–Apr. 10	Mar. 15–Apr. 15.	Mar. 20–Apr. 15	Apr. 10–Apr. 30.	Apr. 20–May 15.	May 1–June 1..	May 15–June 1
Beans, lima	Apr. 15–June 30.	May 1–June 20.	May 15–June 15.	May 25–June 15.	.....	.....	
Beans, snap	Apr. 10–June 30	Apr. 25–June 30.	May 10–June 30.	May 10–June 30.	May 15–June 30.	May 25–June 15.	
Beets	Mar. 10–June 1.	Mar. 20–June 1.	Apr. 1–June 15.	Apr. 15–June 15	Apr. 25–June 15	May 1–June 15.	May 15–June 15
Broccoli, spr't'g (1)	Mar. 15–Apr. 15.	Mar. 25–Apr. 20.	Apr. 1–May 1..	Apr. 15–June 1.	May 1–June 15.	May 10–June 10.	May 20–June 10
Brussels spr'ts (1)	do	do	do	do	do	do	Do.
Cabbage (1)	Mar. 1–Apr. 1..	Mar. 10–Apr. 1.	Mar. 15–Apr. 10	Apr. 1–May 15.	do	May 10–June 15.	May 20–June 1
Cabbage, Chinese	(2)	(2)	(2)	do	do	do	Do.
Carrots	Mar. 10–Apr. 20.	Apr. 1–May 15..	Apr. 10–June 1.	Apr. 20–June 15.	May 1–June 1..	May 10–June 1.	Do.
Cauliflower (1)	Mar. 1–Mar. 20.	Mar. 15–Apr. 20	Apr. 10–May 10.	Apr. 15–May 15.	May 10–June 15.	May 20–June 1.	June 1–June 15
Celery & celeriac	Apr. 1–Apr. 20.	Apr. 10–May 1..	Apr. 15–May 1.	Apr. 20–June 15.	do	do	Do.
Chard	Mar. 15–June 15	Apr. 1–June 15.	Apr. 15–June 15.	do	do	do	Do.
Chervil & chives	Mar. 1–Apr. 1..	Mar. 10–Apr. 10	Mar. 20–Apr. 20	Apr. 1–May 1..	Apr. 15–May 15.	May 1–June 1..	May 15–June 1
Chicory, witloof	June 10–July 1.	June 15–July 1.	June 15–July 1.	June 1–20	June 1–15	June 1–15	June 1–15
Collards (1)	Mar. 1–June 1..	Mar. 10–June 1.	Apr. 1–June 1..	Apr. 15–June 1.	May 1–June 1..	May 10–June 1.	May 20–June 1
Corn salad	Feb. 1–Apr. 1..	Feb. 15–Apr. 15.	Mar. 1–May 1..	Apr. 1–June 1..	Apr. 15–June 1.	May 1–June 15.	May 15–June 15
Corn, sweet	Apr. 10–June 1.	Apr. 25–June 15.	May 10–June 15.	May 10–June 1.	May 15–June 1..	May 20–June 1.	
Cress, upland	Mar. 10–Apr. 15	Mar. 20–May 1.	Apr. 10–May 10.	Apr. 20–May 20.	May 1–June 1..	May 15–June 1.	May 15–June 15
Cucumbers	Apr. 20–June 1.	May 1–June 15.	May 15–June 15.	May 20–June 15.	June 1–15	.....	
Dandelion	Mar. 1–Apr. 1..	Mar. 10–Apr. 10	Mar. 20–Apr. 20	Apr. 1–May 1...	Apr. 15–May 15.	May 1–30	May 1–30
Eggplant (1)	May 1–June 1..	May 10–June 1.	May 15–June 10	May 20–June 15.	June 1–15	.....	
Endive	Mar. 15–Apr. 15	Mar. 25–Apr. 15.	Apr. 1–May 1..	Apr. 15–May 15.	May 1–30	May 1–30	May 15–June 1
Florence fennel	do	do	do	do	do	do	Do.
Garlic	Feb. 20–Mar. 20	Mar. 10–Apr. 1.	Mar. 15–Apr. 15	Apr. 1–May 1...	Apr. 15–May 15	do	Do.
Horseradish (1)	Mar. 10–Apr. 10	Mar. 20–Apr. 20	Apr. 1–30	Apr. 15–May 15	Apr. 20–May 20.	do	Do.
Kale	Mar. 10–Apr. 1.	Mar 20–Apr. 10	Apr. 1–20	Apr. 10–May 1.	Apr. 20–May 10.	do	Do.
Kohlrabi	Mar. 10–Apr. 10	Mar. 20–May 1.	Apr. 1–May 10.	Apr. 10–May 15.	Apr. 20–May 20.	do	Do.
Leeks	Mar. 1–Apr. 1..	Mar. 15–Apr. 15	Apr. 1–May 1..	Apr. 15–May 15.	May 1–May 20.	May 1–15	May 1–15
Lettuce, head (1)	Mar. 10–Apr. 1.	Mar. 20–Apr. 15	do	do	May 1–June 30.	May 10–June 30.	May 20–June 30
Lettuce, leaf	Mar. 15–May 15	Mar. 20–May 15.	Apr. 1–June 1..	Apr. 15–June 15	do	do	Do.
Mustard	Mar. 10–Apr. 20	Mar. 20–May 1.	Apr. 1–May 10.	Apr. 15–June 1.	do	do	Do.
Okra	Apr. 20–June 15.	May 1–June 1..	May 10–June 1.	May 20–June 10	June 1–20	.....	
Onions (1)	Mar. 1–Apr. 1..	Mar. 15–Apr. 10	Apr. 1–May 1...	Apr. 10–May 1.	Apr. 20–May 15	May 1–30	May 10–June 10
Onions, seed	do	Mar. 15–Apr. 1.	Mar. 15–Apr. 15	Apr. 1–May 1..	do	do	Do.
Onions, sets	do	Mar. 10–Apr. 1.	Mar. 10–Apr. 10	Apr. 10–May 1.	do	do	Do.
Parsley	Mar. 10–Apr. 10	Mar. 20–Apr. 20	Apr. 1–May 1..	Apr. 15–May 15.	May 1–20	May 10–June 1.	May 20–June 10
Parsnips	do	do	do	do	do	do	Do.
Peas, garden	Feb. 20–Mar. 20	Mar. 10–Apr. 10	Mar. 20–May 1.	Apr. 1–May 15.	Apr. 15–June 1.	May 1–June 15.	May 10–June 15
Peas, black-eye	May 1–July 1..	May 10–June 15.	May 15–June 1.	.....	.....	.....	
Peppers (1)	May 1–June 1..	May 10–June 1.	May 15–June 10.	May 20–June 10	May 25–June 15.	June 1–15	
Potatoes	Mar. 10–Apr. 1.	Mar. 15–Apr. 10	Mar. 20–May 10	Apr. 1–June 1..	Apr. 15–June 15	May 1–June 15.	May 15–June 1
Radishes	Mar. 1–May 1..	Mar. 10–May 10	do	do	do	do	Do.
Rhubarb (1)	Mar. 1–Apr. 1..	Mar. 10–Apr.10.	Mar. 20–Apr. 15	Apr. 1–May 1..	Apr. 15–May 10.	May 1–20	Do.
Rutabagas	.....	do	May 1–June 1..	May 1–June 1..	May 1–20	May 10–20	May 20–June 1
Salsify	Mar. 10–Apr. 15	Mar. 20–May 1.	Apr. 1–May 15..	Apr. 15–June 1.	May 1–June 1..	May 10–June 1.	Do.
Shallots	Mar. 1–Apr. 1..	Mar. 15–Apr. 15	Apr. 1–May 1..	Apr. 10–May 1.	Apr. 20–May 10.	May 1–June 1..	May 10–June 1
Sorrel	Mar. 1–Apr. 15.	Mar. 15–May 1.	Apr. 1–May 15.	Apr. 15–June 1.	May 1–June 1..	May 10–June 10	May 20–June 10
Soybeans	May 1–June 30.	May 10–June 20.	May 15–June 15.	May 25–June 10.	.....	.....	
Spinach	Feb. 15–Apr. 1.	Mar. 1–Apr. 15.	Mar. 20–Apr. 20	Apr. 1–June 15.	Apr. 10–June 15.	Apr. 20–June 15	May 1–June 15
Spinach, N. Z'land	Apr. 20–June 1.	May 1–June 15.	May 1–June 15.	May 10–June 15.	May 20–June 15.	June 1–15	
Squash, summer	do	do	May 1–30	May 10–June 10.	do	June 1–20	June 10–20
Sweetpotatoes (1)	May 1–June 1..	May 10–June 10.	May 20–June 10	.....	.....	.....	
Tomatoes (1)	Apr. 20–June 1.	May 5–June 10.	May 10–June 15	May 15–June 10.	May 25–June 15.	June 5–20	June 15–30
Turnips	Mar. 1–Apr. 1..	Mar. 10–Apr. 1.	Mar. 20–May 1.	Apr. 1–June 1..	Apr. 15–June 1.	May 1–June 15..	May 15–June 15

(1) Plants (2) Planted in fall only.

must be kept relatively low. Under these conditions the seedlings will be bright green and stocky. Seedlings grown in insufficient light and high temperature become "leggy", so called because they have long, weak stems.

Transplanting

The only purpose served in sowing seeds indoors and transplanting the seedlings outdoors later is earliness. Transplanting a plant does not in itself stimulate the plant to make better growth, but actually checks its growth. Some plants, as young tomato, lettuce, beet, cabbage and related vegetables are easy to transplant because they soon overcome the shock of being transplanted. Plants which recover from the shock less well are pepper, eggplant, and the vine crops which are transplanted. But some plants, as corn, carrots, beans, and spinach, recover from transplanting so poorly that they are rarely transplanted. A certain degree of earliness can be had with such plants by the use of cloches which may be used for all kinds of garden plants.

Transplanting shock can be reduced to a minimum by leaving a mass of soil around the root system. Plants which are especially sensitive to shock should be transplanted in the early seedling stage into a fertopot or other pot which will decompose when placed in the soil. By using such pots, any plant, however sensitive, can be transplanted without being checked in growth.

The soil in the garden should be thoroughly prepared before the transplants are set out. In transplanting the hole can be made with the hand, a pointed stick (dibble), or a trowel —whichever is easiest or preferred. The hole should be large enough to receive adhering soil without crowding. If the ground is unusually dry, fill the hole with water and allow it to soak away before putting ground around the root system of the plant. Care should be taken that no air pockets are allowed to remain around the roots. It is well to set plants just before a shower so that the seedlings may be settled in with rain water.

TABLE 2

Latest safe planting dates and late range of planting dates for vegetables in the open

(Average first fall freezing dates shown in the accompanying maps)

CROP	Planting dates for localities with average first freeze on—					
	AUG. 30	SEPT. 10	SEPT. 20	SEPT. 30	OCT. 10	OCT. 20
Asparagus (1)	.....	.....	.....	.....	Oct. 20–Nov. 15.	Nov. 1–Dec. 15
Beans, lima	.....	.....	.....	June 1-15	June 1-15	June 15-30
Beans, snap	.....	May 15-June 15.	June 1-July 1	June 1-July 10	June 15-July 20	July 1-Aug. 1
Beets	May 15-June 15	do.	do.	do.	June 15-July 25	July 1-Aug. 5
Broccoli, spr'tg (1)	May 1-June 1	May 1-June 1	May 1-June 15.	June 1-30	June 15-July 15	July 1-Aug. 1
Brussels spr'ts (1)	do.	do.	do.	do.	do.	Do.
Cabbage (1)	do.	do.	do.	June 1-July 10.	June 1-July 15.	July 1-20
Cabbage, Chinese	May 15-June 15.	May 15–June 15	June 1-July 1	June 1-July 15.	June 15-Aug. 1.	July 15-Aug. 15
Carrots	do.	do.	do.	June 1-July 10.	June 1-July 20.	June 15-Aug. 1
Cauliflower (1)	May 1-June 1	May 1-July 1	May 1-July 1	May 10-July 15.	June 1-July 25.	July 1-Aug. 5
Celery & celeriac	do.	May 15-June 15	May 15-July 1	June 1-July 5	June 1-July 15.	June 1-Aug. 1
Chard	May 15-June 15	May 15-July 1.	June 1-July 1	do.	June 1-July 20.	Do.
Chervil & chives	May 10-June 10	May 1-June 15.	May 15-June 15.	(2)	(2)	(2)
Chicory, witloof	May 15-June 15	May 15-June 15.	do.	June 1-July 1.	June 1-July 1	June 15-July 15
Collards (1)	do.	do.	do.	June 15-July 15	July 1-Aug. 1	July 15-Aug. 15
Corn salad	do.	May 15-July 1	June 15-Aug. 1.	July 15-Sept. 1.	Aug. 15-Sept. 15	Sept. 1-Oct. 15
Corn, sweet	.....	.....	June 1-July 1	June 1-July 1	June 1-July 10.	June 1-July 20
Cress, upland	May 15-June 15	May 15-July 1.	June 15-Aug. 1.	July 15-Sept. 1.	Aug. 15-Sept. 15	Sept. 1-Oct. 15
Cucumbers	.....	.....	June 1-15	June 1-July 1	June 1-July 1	June 1-July 15
Dandelion	June 1–15	June 1-July 1	June 1-July 1	June 1-Aug. 1	July 15-Sept. 1.	Aug. 1-Sept. 15
Eggplant (1)	.....	.....	.....	May 20-June 10.	May 15–June 15.	June 1-July 1
Endive	June 1-July 1	June 1-July 1.	June 15-July 15.	June 15-Aug. 1.	July 1-Aug. 15.	July 15-Sept. 1
Florence fennel	May 15-June 15	May 15-July 15.	June 1–July 1	June 1-July 1	June 15-July 15	June 15-Aug. 1
Garlic	(2)	(2)	(2)	(2)	(2)	(2)
Horseradish (1)	(2)	(2)	(2)	(2)	(2)	(2)
Kale	May 15–June 15	May 15-June 15	June 1-July 1	June 15-July 15	July 1–Aug. 1.	July 15-Aug. 15
Kohlrabi	do.	June 1-July 1	June 1-July 15.	do.	do.	Do.
Leeks	May 1-June 1	May 1-June 1	(2)	(2)	(2)	(2)
Lettuce, head (1)	May 15-July 1.	May 15-July 1	June 1-July 15.	June 15–Aug. 1.	July 15-Aug. 15	Aug. 1-30
Lettuce, leaf	May 15-July 15.	May 15-July 15.	June 1-Aug. 1	June 1-Aug. 1	July 15-Sept. 1.	July 15-Sept. 1
Mustard	do.	do.	do.	June 15-Aug. 1.	July 15-Aug. 15	Aug. 1-Sept. 1
Okra	.....	.....	June 1-20	June 1–July 1	June 1-July 15.	June 1-Aug. 1
Onions (1)	May 10-June 10	May 1-June 1	(2)	(2)	(2)	(2)
Onions, seed	May 1-June 1.	do.	(2)	(2)	(2)	(2)
Onions, sets	do.	do.	(2)	(2)	(2)	(2)
Parsley	May 15–June 15	May 1-June 15.	June 1-July 1	June 1-July 15.	June 15-Aug. 1.	July 15-Aug. 15
Parsnips	May 15-June 1.	do.	May 15-June 15.	June 1-July 1	June 1-July 10.	(2)
Peas, garden	May 10-June 15	May 1–July 1	June 1-July 15.	June 1-Aug. 1.	(2)	(2)
Peas, black-eye	.....	.....	.....	.....	June 1-July 1	June 1-July 1
Peppers (1)	.....	.....	June 1-June 20.	June 1-July 1	do.	June 1-July 10
Potatoes	May 15–June 1.	May 1-June 15.	May 1-June 15.	May 1-June 15.	May 15-June 15.	June 15-July 15
Radishes	May 1-July 15.	May 1-Aug. 1	June 1-Aug. 15.	July 1-Sept. 1.	July 15-Sept. 15	Aug. 1-Oct. 1
Rhubarb (1)	Sept. 1-Oct. 1	Sept. 15–Oct. 15	Sept. 15-Nov. 1.	Oct. 1-Nov. 1.	Oct. 15-Nov. 15	Oct. 15-Dec. 1
Rutabagas	May 15-June 15	May 1-June 15.	June 1-July 1	June 1-July 1	June 15-July 15	July 10-20
Salsify	May 15-June 1.	May 10-June 10	May 20-June 20.	June 1-20	June 1-July 1	June 1-July 1
Shallots	(2)	(2)	(2)	(2)	(2)	(2)
Sorrel	May 15-June 15.	May 1-June 15.	June 1-July 1	June 1-July 15.	July 1-Aug. 1	July 15-Aug. 15
Soybeans	.....	.....	.....	May 25-June 10.	June 1-25	June 1-July 5
Spinach	May 15-July 1.	June 1-July 15.	June 1-Aug. 1	July 1-Aug. 15.	Aug. 1-Sept. 1.	Aug. 20-Sept. 10
Spinach, N. Z'land	.....	.....	.....	May 15-July 1	June 1-July 15.	June 1-Aug. 1
Squash, summer	June 10-20	June 1-20	May 15-July 1	June 1-July 1	do.	June 1-July 20
Squash, winter	.....	.....	May 20-June 10.	June 1-15	June 1-July 1	June 1-July 1
Sweetpotatoes (1)	.....	.....	.....	.....	May 20–June 10	June 1-15
Tomatoes (1)	June 20-30	June 10-20	June 1–20	June 1-20	June 1-20	June 1-July 1
Turnips	May 15–June 15.	June 1-July 1	June 1-July 15.	June 1-Aug. 1	July 1-Aug. 1	July 15-Aug. 15

(1) Plants (2) Generally spring-planted only.

Planting the Seeds

A

The equipment needed for planting seeds consists of a watering can, a trowel, a firming board with a handle, a leveling stick, a marking stick, and a dibble.

B

A good mixture in which to plant the seeds consists of equal parts of sand and compost. These two materials should be thoroughly mixed.

Table 2 (continued)

Latest safe planting dates and late range of planting dates for vegetables in the open

(Average first fall freezing dates shown in the accompanying maps)

CROP	Planting dates for localities with average first freeze on—					
	OCT. 30	NOV. 10	NOV. 20	NOV. 30	DEC. 10	DEC. 20
Asparagus (1)	Nov. 15-Jan. 1.	Dec. 1-Jan. 1..	.....	.....	.....	
Beans, lima	July 1-Aug. 1..	July 1-Aug. 15..	July 15-Sept. 1.	Aug. 1-Sept. 15.	Sept. 1-30.....	Sept. 1-Oct. 1
Beans, snap	July 1-Aug. 15.	July 1-Sept. 1..	July 1-Sept. 10.	Aug. 15-Sept. 20	.....do.....	Sept. 1-Nov. 1
Beets	Aug. 1-Sept. 1.	Aug. 1-Oct. 1..	Sept. 1-Dec. 1.	Sept. 1-Dec. 15.	Sept. 1-Dec. 31.	Sept. 1-Dec. 31
Broccoli, spr't'g (1)	July 1-Aug. 15.	Aug. 1-Sept. 1..	Aug. 1-Sept. 15.	Aug. 1-Oct. 1..	Aug. 1-Nov. 1.	Do.
Brussels spr'ts (1)	.....do.....	.....do.....	.....do.....	.....do.....	.....do.....	Do.
Cabbage (1)	Aug. 1-Sept. 1.	Sept. 1-15.....	Sept. 1-Dec. 1..	Sept. 1-Dec. 31.	Sept. 1-Dec. 31.	Do.
Cabbage, Chinese	Aug. 1-Sept. 15.	Aug. 15-Oct. 1.	Sept. 1-Oct. 15.	Sept. 1-Nov. 1.	Sept. 1-Nov. 15.	Sept. 1-Dec. 1
Carrots	July 1-Aug. 15.	Aug. 1-Sept. 1.	Sept. 1-Nov. 1..	Sept. 15-Dec. 1.	Sept. 15-Dec. 1.	Sept. 15-Dec. 1
Cauliflower (1)	July 15-Aug. 15	.....do.....	Aug. 1-Sept. 15.	Aug. 15-Oct. 10.	Sept. 1-Oct. 20.	Sept. 15-Nov. 1
Celery & celeriac	June 15-Aug. 15	July 1-Aug. 15.	July 15-Sept. 1.	Aug. 1-Dec. 1..	Sept. 1-Dec. 31.	Oct. 1-Dec. 31
Chard	June 1-Sept. 10.	June 1-Sept. 15	June 1-Oct. 1...	June 1-Nov. 1..	June 1-Dec. 1..	June 1-Dec. 31
Chervil & chives	(2)	(2)	Nov. 1-Dec. 31.	Nov. 1-Dec. 31.	Nov. 1-Dec. 31.	Nov. 1-Dec. 31
Chicory, witloof	July 1-Aug. 10.	July 10-Aug. 20	July 20-Sept. 1.	Aug. 15-Sept. 30	Aug. 15-Oct. 15.	Aug. 15-Oct. 15
Collards (1)	Aug. 1-Sept. 15	Aug. 15-Oct. 1.	Aug. 25-Nov. 1.	Sept. 1-Dec. 1.	Sept. 1-Dec. 31.	Sept. 1-Dec. 31
Corn salad	Sept. 15-Nov. 1.	Oct. 1-Dec. 1...	Oct. 1-Dec. 1...	Oct. 1-Dec. 31..	Oct. 1-Dec. 31.	Oct. 1-Dec. 31
Corn, sweet	June 1-Aug. 1..	June 1-Aug. 15.	June 1-Sept. 1..	.....	.....	
Cress, upland	Sept. 15-Nov. 1.	Oct. 1-Dec. 1...	Oct. 1-Dec. 1..	Oct. 1-Dec. 31.	Oct. 1-Dec. 31..	Oct. 1-Dec. 31
Cucumbers	June 1-Aug. 1..	June 1-Aug. 15.	June 1-Aug. 15.	July 15-Sept. 15	Aug. 15-Oct. 1.	Aug. 15-Oct. 1
Dandelion	Aug. 15-Oct 1..	Sept. 1-Oct. 15.	Sept. 1-Nov. 1..	Sept. 15-Dec. 15	Oct. 1-Dec. 31..	Oct. 1-Dec. 31
Eggplant (1)	June 1-July 1..	June 1-July 15.	June 1-Aug. 1..	July 1-Sept. 1..	Aug. 1-Sept. 30	Aug. 1-Sept. 30
Endive	July 15-Aug. 15	Aug. 1-Sept. 1..	Sept. 1-Oct. 1..	Sept. 1-Nov. 15.	Sept. 1-Dec. 31.	Sept. 1-Dec 31
Florence fennel	July 1-Aug 1...	July 15-Aug. 15	Aug. 15-Sept. 15	.....do.....	Sept. 1-Dec. 1..	Sept. 1-Dec. 1
Garlic	(2)	Aug. 1-Oct. 1..	Aug. 15-Oct. 1..	Sept. 1-Nov. 15.	Sept. 15-Nov. 15	Sept. 15-Nov. 15
Horseradish (1)	(2)	.....	.....	.....	.....do.....	
Kale	July 15-Sept. 1.	Aug. 1-Sept. 15	Aug. 15-Oct. 15.	Sept. 1-Dec. 1..	Sept. 1-Dec. 31.	Sept. 1-Dec. 31
Kohlrabi	Aug. 1-Sept. 1..	Aug. 15-Sept. 15	Sept. 1-Oct. 15.	.....do.....	Sept. 15-Dec. 31	Do.
Leeks	(2)	(2)	Sept. 1-Nov. 1..	Sept. 1-Nov. 1.	Sept. 1-Nov. 1.	Sept. 15-Nov. 1
Lettuce, head (1)	Aug. 1-Sept. 15.	Aug. 15-Oct. 15.	.....do.....	Sept. 1-Dec. 1..	Sept. 15-Dec. 31	Sept. 15-Dec. 31
Lettuce, leaf	Aug. 15-Oct. 1.	Aug. 25-Oct. 1.	.....do.....	.....do.....	.....	Do.
Mustard	Aug. 15-Oct. 15.	Aug. 15-Nov. 1.	Sept. 1-Dec. 1..	.....do.....	Sept. 1-Dec. 1..	Sept. 16-Dec. 1
Okra	June 1-Aug. 10.	June 1-Aug. 20.	June 1-Sept. 10.	June 1-Sept. 20.	Aug. 1-Oct. 1..	Aug. 1-Oct. 1
Onions (1)	(2)	Sept. 1-Oct. 15.	Oct. 1-Dec. 31..	Oct. 1-Dec. 31.	Oct. 1-Dec. 31..	Oct. 1-Dec. 31
Onions, seed	(2)	(2)	Sept. 1-Nov. 1..	Sept. 1-Nov. 1.	Sept. 1-Nov. 1..	Sept. 15-Nov. 1
Onions, sets	(2)	Oct. 1-Dec. 1..	Nov. 1-Dec. 31.	Nov. 1-Dec. 31.	Nov. 1-Dec. 31.	Nov. 1-Dec. 31
Parsley	Aug. 1-Sept. 15	Sept. 1-Nov. 15.	Sept. 1-Dec. 31	Sept. 1-Dec. 31.	Sept. 15-Dec. 31	Sept. 1-Dec. 31
Parsnips	(2)	(2)	Aug. 1-Sept. 1.	Sept. 1-Nov. 15	Sept. 1-Dec. 1..	Sept. 1-Dec. 1
Peas, garden	Aug. 1-Sept. 15.	Sept. 1-Nov. 1.	Oct. 1-Dec. 1...	Oct. 1-Dec. 31..	Oct. 1-Dec. 31..	Oct. 1-Dec. 31
Peas, black-eye	June 1-Aug. 1..	June 15-Aug. 15	July 1-Sept. 1..	July 1-Sept. 10.	July 1-Sept. 20.	July 1-Sept. 20
Peppers (1)	June 1-July20..	June 1-Aug. 1..	June 1-Aug. 15.	June 15-Sept. 1.	Aug. 15-Oct. 1..	Aug. 15-Oct. 1
Potatoes	July 20-Aug. 10.	July 25-Aug. 20	Aug. 10-Sept. 15	Aug. 1-Sept. 15.	Aug. 1-Sept. 15.	Aug. 1-Sept. 15
Radishes	Aug. 15-Oct. 15.	Sept. 1-Nov. 15	Sept. 1-Dec. 1..	Sept. 1-Dec. 31.	.....do.....	Oct. 1-Dec. 31
Rhubarb (1)	Nov. 1-Dec. 1..	.....	.....	.....	.....	
Rutabagas	July 15-Aug 1..	July 15-Aug 15.	Aug. 1-Sept. 1.	Sept. 1-Nov. 15.	Oct. 1-Nov. 15..	Oct. 15-Nov. 15
Salsify	June 1-July 10.	June 15-July 20	July 15-Aug. 15	Aug. 15-Sept. 30	Aug. 15-Oct. 15.	Sept. 1-Oct. 31
Shallots	(2)	Aug. 1-Oct. 1..	Aug. 15-Oct. 1.	Aug. 15-Oct. 15.	Sept. 15-Nov. 1.	Sept. 15-Nov. 1
Sorrel	Aug. 1-Sept. 15	Aug. 15-Oct. 1.	Aug. 15-Oct. 15.	Sept. 1-Nov. 15.	Sept. 1-Dec. 15.	Sept. 1-Dec. 31
Soybeans	June 1-July 15.	June 1-July 25.	June 1-July 30.	June 1-July 30.	June 1-July 30	June 1-July 30
Spinach	Sept. 1-Oct. 1..	Sept. 15-Nov. 1.	Oct. 1-Dec. 1...	Oct. 1-Dec. 31..	Oct. 1-Dec. 31..	Oct. 1-Dec. 31
Spinach, N. Z'land	June 1-Aug. 1.	June 1-Aug. 15.	June 1-Aug. 15.	.....	.....	
Squash, summer	.....do.....	June 1-Aug. 10.	June 1-Aug. 20.	June 1-Sept. 15	June 1-Sept. 15	June 1-Oct. 1
Squash, winter	June 10-July 10	June 20-July 20	July 1-Aug 1...	July 15-Aug. 15.	Aug. 1-Sept. 1..	Aug. 1-Sept. 1
Sweetpotatoes (1)	June 1-15.....	June 1-July 1..	June 1-July 1..	June 1-July 1..	June 1-July 1..	June 1-July 1
Tomatoes (1)	June 1-July 1..	June 1-July 15.	June 1-Aug 1..	Aug. 1-Sept. 1..	Aug. 15-Oct. 1.	Sept. 1-Nov. 1
Turnips	Aug. 1-Sept. 15.	Sept. 1-Oct. 15.	Sept. 1-Nov. 15	Sept. 1-Nov. 15.	Oct 1-Dec. 1...	Oct. 1-Dec. 31

(1) Plants

(2) Generally spring-planted only.

C.

The mixture should then be put into the flat until the flat is more than full. The longer stick shown in A, the leveling stick is then used to level the soil and push off the soil extending above the level of the flat. Then the marking stick is used for making shallow seed trenches as shown in C.

D.

The seeds are then placed in the trenches as shown in this photograph.

FALL FROST MAP

Average dates of the first killing fall frosts in the United States, 1899 to 1938. Gardeners should locate the line nearest to the locality in which they live, note the date on that line (the first figure indicates the month, the second the day; thus 9-20 is Sept. 20), and then refer to Table 2. This map and the table are most useful in the absence of local information. (These maps have been redrawn from U. S. Weather Bureau originals.)

E.

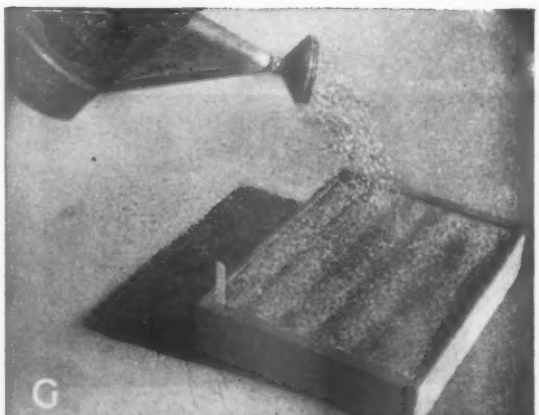
The seeds are then covered with dry sand flowing from a flower pot. The rate of flow can be regulated by placing the forefinger over a part of the hole in the bottom of the pot.

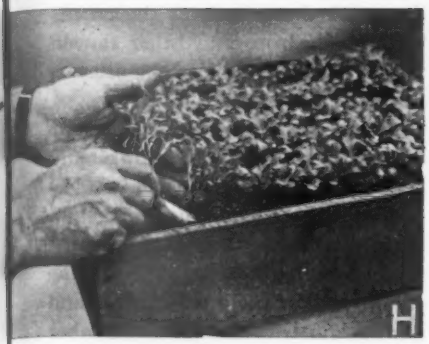
F.

The sand which covers the seeds is firmed with a firming board as shown in this photograph.

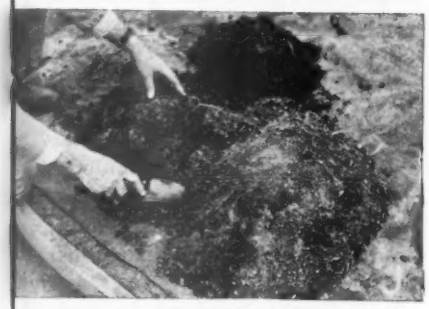
G.

The seed flat is marked with a pencil (not indelible) on a wooden stake (pot label) and the flat is watered thoroughly with a sprinkling can which produces a fine spray. Watering should be repeated until the soil in the flat is completely wet.





When the soil in the flat is ready and has been moistened, the seedlings to be planted into it are carefully removed with a dibble in such a way that the roots of the seedlings are not injured as shown above.



A good soil mixture into which to transplant the seedlings consists of 1 part compost, 1 part sand, and 2 parts leaf-mold, as shown in this photograph. This mixture is then filled into a seed flat which is 12 inches wide, 18 inches long and 3 or 4 inches deep.

The dibble is then used to make the holes into which the roots of the seedlings are placed and carefully firmed. The seedlings should be spaced from one to two inches apart. When the flat has been planted full, the seedlings should be watered with the sprinkling can until the soil is thoroughly wet. In this way the soil will be settled around roots of seedlings and insure good growth.

I don't believe *that*

By LEONARD WICKENDEN

I DON'T believe that the addition of mineral fertilizers to the soil necessarily means that a high mineral content will be found in crops grown on that soil. For some years, advocates of the use of commercial fertilizers have made a great point of the fact that, in certain regions of the U. S. A., there is an apparent shortage of mineral matter in the crops grown in those areas. They have also claimed that on *all* cultivated land there is such a heavy drain on the mineral constituents of the soil that the addition of chemical fertilizers is not only desirable but necessary if our crops are to contain the nutritional elements needed to maintain a high level of national health.

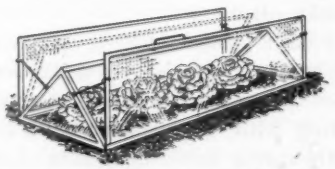
I believe that this assumption is erroneous because the reasoning on which it is based is fallacious, but the point I want to discuss at this time is whether a shortage of mineral matter in crops can be corrected by adding, to the soil, mineral matter in the form of commercial fertilizers. The chemiculturists have always assumed that this must be so, but the evidence supporting their assumption is far from conclusive.

Last summer, Dr. Firman E. Bear, Chairman of the Department of Agricultural Chemistry at Rutgers University, read a paper before the Soil Science Society in which he reported his findings in an investigation made by him into the mineral content of various vegetable crops grown in different regions of the United States. The investigation had been suggested by Friends of the Land and was financed by *The Readers Digest*. Dr. Bear's figures showed that total mineral content, and most of the individual minerals, tended to increase from east to west, and these figures have been hailed by some of the advocates of commercial fertilizers as proving that the "worn out" soils of the East are so lacking in minerals that they are incapable of producing vegetables with a mineral content comparable with that of vegetables grown in North Central states. From this they deduce that more commercial fertilizers must be used.

An examination of Dr. Bear's results leads me to a very different conclusion. The fact that he clearly shows that the eastern soils were *not* deficient in minerals. He gives the average amount of commercial fertilizers used by the farmers in the eastern states and in the North Central states, and we find that in the former, 100% of the farmers used an average of 52 lbs. phosphorus and 100 lbs. potassium per acre, whereas, in the latter, only 40% of the farmers used any commercial fertilizer at all and those that did used only 40% of the amount used in the East. In spite of this, however, the vegetables from the North Central states (where, Dr. Bear states, "less dependence is placed on fertilizers and greater use made of clover sods and manure") contained more minerals than those from the East.

Perhaps you wonder if this indicates that the Eastern soils were so depleted of minerals that the quantities added by the farmers did not supply sufficient to bring the vegetables up to the level of those from the North Central States. Further examination of the figures, however, shows that the Eastern farmers were adding to their soil an amount of phosphorus and potassium greatly

(*Continued on page* 57)



The cloche, made of metal frame and plexiglass extends gardening through most of the year.

GARDEN CALENDAR for MARCH

By WM. H. EYSTER, Ph.D.

THE NORTH

March is a tempermental month, a mixture of sunny and cloudy days, spring showers and winter snows, freezing and thawing, spring flowers and dormant shrubs and trees. It is time to remove the coarser parts of the winter mulch, but don't let the warm March days fool you into removing all the mulch from the borders and garden beds. In all events, the finer parts of the mulch should be allowed to remain permanently to insulate the soil against rapid temperature changes and to conserve soil moisture. The fine mulch also serves as food for the soil organisms. Since more frosts are ahead, it is well to retard spring growth as much as possible.

The Lawn:—Fill in the low places or depressions in the lawn during the period of freezing nights and thawing days, as the alternate freezing and thawing will help settle the soil. Roll the lawn lightly when it is sufficiently dry. The presence of mosses in the lawn indicate (1) poor drainage, (2) acid soil, or (3) a deficiency of one or more plant nutrients. If mosses are apparent, give the lawn a good dressing of pulverized phosphate rock and finely screened compost with a little bonemeal mixed in. This early spring feeding will result in such a rapid growth of the lawn grasses that the weeds will be crowded out.

Bare spots in the lawn should be reseeded at this time. A good method of seeding is to mix the lawn grass seed with finely screened compost. This mixture should then be spread over the bald spots to a thickness of about an inch. Planted in this way the seeds will germinate quickly and the grass will grow rapidly.

Hotbeds and Coldframes:—It is time to put your hotbeds and coldframes into operation if this has not already been done. It is important to watch carefully the ventilation of the hotbeds and coldframes, especially on sunny days. The sashes should be closed at night but opened little or much, depending upon the intensity and amount of sunlight, during the day.

Sow the seeds in equal parts of compost and sand in flats or pots. If the seedlings are to grow in the soil, prepare the bed with equal parts of sand, compost or well rooted manure, and soil. Then cover this soil with a layer one inch thick composed of equal parts of compost and sand in which the seeds are to be sown and germinated. During the germination period, keep the temperature at about 75 degrees F. After the seeds have developed into little seedlings, lower the temperature to about 60 degrees F. and keep them in bright light. A high temperature and dilute light cause the seedlings and plants to become "leggy", while low temperatures and bright light will give you short stocky plants.

Flower Garden:—Check your flower beds and borders to make sure that the winter mulch is not interfering with the emergence of the early spring flowering plants. Loving hands will carefully push aside the coarser parts of the mulch which will then still protect but not interfere with the growth of the crocus-scilla, snowdrop, and other flowers which grow so boldly in the blustery days of March.

Set out pansies and violets as soon as the ground permits. Make cuttings of chrysanthemums and azalea-mums, and other fall blooming flowers. Sweet peas should be planted not later than the middle of the month in northern tier countries and earlier farther south. Remember sweet peas insist on well drained soil, a goodly amount of organic matter, and a full complement of the essential soil nutrients. To make sure that some of the trace elements are not missing, add some granulated seaweeds to the soil before planting the seeds.

In your tulip beds, sow seeds of violets, arabis, Siberian wallflower, and early blue phlox to hide the yellowing leaves of the bulbous plants later in the spring. Sow outdoors also seeds of cornflower, poppy, larkspur, polygonum, and annual chrysanthemum.

It is time to sow indoors seeds of such tender annuals as snapdragon, calendula, petunia, nicotiana, aster, alyssum, ageratum, marigold, and others.

Window Garden:—Keep your gardenias in a sunny place and sprinkle them frequently with water. Keep the temperature fairly high but the air must be kept moist if you want flowers. Plants in porpous clay pots require more water than those growing in glazed pots. Water cacti and succulents sparingly and not every day. Geraniums need plenty of sunshine, but should be kept rather dry. After watering, drain all water from the saucer under the pot. This is a good time to propagate your African violets. Cut off healthy leaves and insert the stalks up to the leaf blade in clean sand which is kept moist. From your ferns, remove the long runner-like stems which grow out from the center of the plants.

Shrubs and Trees:—Roses and other deciduous shrubs may be planted just as soon as soil conditions will permit. Flowering shrubs

gladiolus for succession. Make divisions of old hemerocallis or buy which produce flowers on *new growth* should now be pruned if this has not already been done.

All the bush and cane fruits, as well as strawberries, should be given a moderate top-dressing of compost fortified with pulverized rock phosphate and granulated seaweed. Over this may then be placed a mulch for controlling weeds and conserving soil moisture

THE NORTHWEST

The Flower Garden:—As soon as soil conditions permit, sow seeds of China aster, Canterbury bell, columbine, coreopsis, gaillardia, petunia, Shasta daisy and other long-season plants in seed flats in the North and in the open farther south. Plant bulbs of montbretia which may be left in the soil for a number of years. Transplant tuberous begonia seedlings in soil rich in compost. Pinch back young pelargoniums and geraniums, and prune old plants. Sow seeds of the dwarf annual dahlias. You will be delighted with Unwin's hybrids which grow about 18 inches high and Coltness's which are only 12 inches high.

Make cuttings of *Daphne mesereum* to be set out in the garden later. With them may be planted groups of *Primula acaulis*. Plant dependable kinds of perennials which will make a good appearance throughout most of the year. And do not forget Japanese anemone and Christmas rose.

Some annuals which bloom all year under favorable conditions are cuphea firefly, Nierembergia purple robe, and alyssum Victoria Queen. Tigridia is an outstanding showy flower where a gay color is desired. Its colors include bright yellows, oranges, pinks, and reds. Tuberoses must not be overlooked. Start bulbs indoors in March. Tritonia is unsurpassed as a cut flower.

The Vegetable Garden:—Follow suggestions as given for the *North*.

Shrubs and Trees:—Roses may still be planted without being balled and bagged. Butterfly bush should be cut back severly in March. Prune winter-blooming shrubs immediately after they finish flowering. Prune poinsettias quite severely.

THE SOUTHWEST*

March is generally one of our busiest months in the Southwest. During the first week the work of bare root material should be completed: deciduous fruit trees, grapes, berries, roses and deciduous trees and shrubs. Large balled conifers and hardy evergreens should be planted before the new roots emerge from their decaying burlap. Cover crops should be spaded or disced in so as to get the ground in good condition for the warm weather crops. Your winter sheet composting, too, should be worked in while it is in prime condition. In early spring as in the fall, it is the night temperatures that determine your planting program. Do not rush to plant the heat loving limas the first hot spell in March.

Flower Garden:—Sow in the open such annuals as sweet alyssum and portulaca which can be broadcasted, and in rows such other annuals as have long taproots which resent transplanting: larkspurs, poppies, Mexican tulip poppy (*Hunnemannia fumeriaefolia*), lavatera, sweet sultan and salpiglossis. Sow in protected seed beds ageratum, marigolds, lobelia, comos, annual phlox and zinnias. The nurseries are well supplied with seasonable material in plant bands and flats if you have not raised your own. In the full sun plant hardy asters, aster Frikarte, delphinium, geum, pentstemon, salvia farinacea, Blue Bedder, Mexican bush salvia (*Salvia leucantha*), carnations, Nierembergia Purple Robe, Marconi and Esther Reed Shastas, *Dianthus plumarius*, white and yellow marguerites, blue marguerites (*Felecia amelloides*) and zonal geranium and Lady Washington geraniums started from cuttings earlier in the season.

Many summer bulbs can be planted in March. Continue planting new varieties selecting the best of the evergreens. Cannas and caladiums give tropical effects. Crinums, clivias, agapanthus and *Amocrinum Howardi* make permanent evergreen clumps. The new Earlham montbretias make a fine succession for gladiolus. *Kniphofias* (Red Hot Pokers) dwarf and tall put brilliant color in your gardens. For poor soils use the evergreen sprekelia. Ismene and Mexican tuberoses bring subtle fragrance to summer gardens. Tigridias bring a flash of color and in sheltered spots alstroemeria can be used. Pots and gallon cans of Regal Lily, *L. phileppinense* and *L. formosanum* may be transferred to your borders.

Make cuttings of the earlier hardy chrysanthemums, Gazanias, purple sage, blue marguerites and white and yellow marguerites. Feed your late chrysanthemums, but do not make cuttings until later in the season. Such fine ones as the Elsie Kramer series and the Treasure Island series are, give abundance of bloom until after New Year. Make several eye cuttings of poinsettias, setting into the ground up to the last eye. Make divisions of purple sage, hardy chrysanthemum. Pot up tender annuals brought on in greenhouse and semperflorens begonia seedlings. Dahlia seedlings and cuttings may be transferred to 3" pots or bands.

Trees and Shrubs:—As the weather warms up citrus and subtropicals can be planted. Be careful not to break balls and use your catalogs to select the best ones for your zone. By all means use the excellent pineapple guava for untrimmed hedges and as specimen plants. Avocados and sapotes are good evergreen ornamentals as well as fruiting trees. In setting new homes established ornamentals of all sorts may be planted from gallon and 5 gallon cans.

Vegetables:—Pot up the tender vegetables (egg plant, tomatoes, peppers) in plant bands. In planting outside use hot caps. By the last

* Charlotte M. Hoak, 1125 Stratford Ave., South Pasadena, California.

of the month bush and pole beans and summer squash can be planted.

Pocket Handkerchief Salad Garden:—Salad gardens are recommended for those who have little time and small spaces for planting. Set plants of the leaf lettuce, late Savoy cabbage and seedling onions. Sow seeds of the different hardy vegetables beets, carrots, radishes and kohlrabi, substituting this fine vegetable for turnips which are apt to be poor when hot weather comes on. In small gardens grow as much vertically as possible. Evergreen Chinese climbing cucumbers and the little known Armenian cucumber, Hirta, for cool and tasty salads. The old fashioned yard long climbing beans are easy harvested. Scarlet runners make snap, shell and dry beans and screen off unsightly views.

THE SOUTH**

Evidences of the arrival of spring in the South are blooming snowdrops, scillas, muscari, crocuses, narcissi, daffodils, and early white and blue irises. Vieing with these for brilliance of colors are pansies, violets, and phlox in scarlet, violet, salmon, yellow, and white.

Flower Garden:—Plant corms of gladiolus every 10 days for succession of flowers, castor beans, marigolds, elephant ear, ricepaper plant, globe artichoke, and goldenrod. Divide and reset all kinds of perennials. It is seed sowing time in the South, half-hardy annuals in the middle South and all annuals in the lower South.

Shrubs and Trees:—Prune broadleaved evergreens. Cut back severly ligustrums and pittosporums. Dead wood should be cut out of all woody plants including roses. Hybrid tea roses must be pruned carefully, while the polyanthus and floribunda roses should be cut back severely. Yellow jasmine should be transplanted immediately after the flowering period. Transplant crepemyrtles and remember the more severely they are cut back the more profusely they will bloom.

Vegetable Garden:—Plant seeds of beans, onions, beets, peas, radishes, and others of similar requirements in early March. Later in the month may be planted the more tender vegetables, as sweet corn, cucumbers, squash, and peppers. This is the month to transplant tomatoes and all other vegetables not yet set out in the fields for production. In the planting of vegetables, it is best to follow local practices so far as possible. Planting dates vary according to exposure, soil types, and elevations.

Flower Garden:—This is a good month to start the various shrubs and vines that can be started from cuttings. Gardenia, rose, hibiscus, allamanda, bougainvillea, Surinam cherry, the latter one of the most attractive plants for hedges, flame vine, angel trumpet, make rapid growth during this season. Plant seeds of ageratum or floss flower, aster, balsam, scarlet runner bean, cosmos, Chinese forget-me-not, dahlia, Shasta daisy, dianthus or Chinese pink, gaillardia, globe amaranth, ornamental gourd, helianthus, strawflower, marigold, morning glory, nasturtium, petunia, portulaca, salvia, tithonia, verbena, vinca, zinnia.

Vegetable Garden:—If possible to do so, give the following plants an alkaline soil, as they are very sensitive to acidity: cabbage, cauliflower, lettuce, onion, spinach, asparagus, beets, parsnips, celery, muskmelon, rutabaga. Compost made without lime, in which oak leaves have a prominent place, make an acid soil for the few garden products that prefer it. Blueberries and strawberries, potatoes, sweet potatoes, parsley, are on the acid side. Other garden plants, following, are not particular as to the exact pH in the soil, and flourish in the neutral soil made by the regular composting methods: beans of all kinds, beets, cantaloupe, carrot, collard, corn, cucumber, eggplant, kale, kohlrabi, mustard, okra, pumpkin, radish, roselle, squash, swiss chard, tomato, turnip, watermelon.

Trees and Shrubs:—The fig, one of the most valuable of fruits, could be raised to advantage in Florida much more extensively than it is. One of the drawbacks to starting figs is the high price charged by some of the nurseries. However, after getting started with a few trees,

(*Continued on page* 56)

** Edwin H. Abrams, St. Cloud, Florida

The Soil and Health Foundation

The Soil and Health Foundation is setting up fertilizer experiments this spring which will be continued over a quarter century or longer, if necessary. The purpose of the experiments is to determine what are the effects of various kinds of artificial chemical fertilizers and composts with natural pulverized rocks have on the time and percentage of germination of seeds, growth characteristics of the experimental plants, time to maturity, fertility of the plants, yield, reactions to disease-producing fungi and insect pests, and other factors pertaining to the health of the plants.

For these experiments large cement cylinders about 10 feet in diameter and 4 feet high are being used for the different cultures. Each year the seed produced in any particular culture will be used to reseed the culture the following year to get data on the "running out" of plant varieties. These experiments will be available for the observation and study of those who make inspection trips to the Experimental Organic Farm.

These experiments are supported by contributions from those who wish to have a part in such fundamental studies. All who make a contribution become members of the Foundation and receive its publication. Contributions are deductible from income tax returns. Send your contributions to the Soil and Health Foundation, 46 South West Street, Allentown, Pa.

SEMINAR

DEFICIENCIES and TRACE ELEMENTS

DEFICIENT AREAS

Q. The soil in this part of the country is considered very deficient in all minerals. I have a fine large compost heap "percolating" but since I have gathered all the materials in it, right in this locality it will not add to the mineral content of the soil.

There must be some way to grow vegetables with the right combination of minerals. I shall appreciate it very much if you can enlighten me about this.

A. The point you bring up is interesting. Unless you come from a part of the country which is known to lack a certain important element, there is usually no danger of not having sufficient minerals. Such sections would be the goitre belt in parts of Ohio and Michigan where iodine is lacking in the soil. In such cases it would be important to bring in organic materials from other sections. The perfect thing would be to use seaweed and kelp, also fish cuttings from sea going fish.

We also recommend that raw phosphate rock be used along with your regular composts, as this contains many valuable minerals. If you use ground limestone in the compost heap, this may come from a section of the country distant from your locality. There are other products that you could get from more distant points, such as dried blood and bone meal.

Another excellent item to use is ground up oyster shells instead of limestone in the heap because, coming from the sea, it will give you much needed elements.

Where there is a question of soil deficiencies, be sure to use leaves in the heap, because the roots of trees go down 20 and 25 feet where the vital elements have not been exhausted.

DEFICIENCIES AND COMPOST

Q. There is a basic principle involved in Organic Gardening, the process of course, which is not yet clear to me. I hope you will answer this question. In the production of organic compost all the materials used, directly or indirectly, come from impoverished soils, except possibly where sea vegetation is used in place of manure. The plants raised on our soils in their present condition are of necessity deficient in their mineral and vitamin content. When used in compost and put back into deficient soil they leave the soil still deficient. Manure from animals when fed on these plants must, for the same reason, be deficient as plant food sources. The parts of animals bodies when used as part of a compost suffer from the same cause. How then does organic fertilizing bring the soil back to a perfect condition in terms of plant food content?

A. Plants as well as animals are gatherers of soil minerals. The analysis of leaves shows that their mineral content is high above that of the surrounding ground. Likewise a recent article in *Soil Science* on earthworm castings made it plain that these are much higher in most minerals than the surrounding soil. By adding organic material and by encouraging earthworms, you usually increase the fertility accordingly. However, we suggest also the use of phosphate rock, limestone and dolomite for the purpose of adding minerals that otherwise would be lacking. But, in general, you know, of course, that compost is not only readily available plant food, but also concentrated when compared with the materials that go into the heap originally.

Where it is believed that some kind of soil deficiency exists, then it is advisable to bring in mild soil amendments from regions other than your own—for example, raw ground phosphate rock and limestone, dried blood and bone-meal, kelp frond, sea weed, etc. The use of a large quantity of leaves also becomes important in such a case because the roots of trees go down sometimes 20 to 25 feet and bring up valuable minerals from unexhausted areas.

—o—

GROUND ROCK

Q. What are the values of ground rock materials?

A. Soil is derived from parent rock material by the weathering and disintegrating forces of nature acting over thousands of years. All the mineral constituents normally present in the soil are therefore also present in the natural rock from which it was formed. If the soil becomes depleted of certain of these mineral elements through leaching or erosion, or made unavailable by the extended use of chemical fertilizers, then it would seem only reasonable to go to the parent rock material for the replacement of these elements.

Although it usually takes nature about 100 years to make ¼ inch of soil, modern grinding machinery can pulverize rock materials to such fineness that it is available for plant assimilation in relatively short periods of time. It would therefore now be practical to use these finely ground rock materials to supplement mineral losses in the soil. Such natural rock materials as phosphate and potash rock, dolomite and regular limestone, marl, feldspar, marble, granite and many others, when finely ground will add valuable mineral constituents to the soil.

POTASH

Q. A test of my soil shows a lack of potash in it. What do you advise?

A. The test probably merely shows that there may not be any soluble or available potash present, but usually there is sufficient potash present in most soils in an unavailable form. The problem is how to make the insoluble potash soluble. This can easily be done by putting organic matter into the soils. This multiplies the bacteria and also gives mild organic acids which do the job. Also there is becoming available in the market raw ground potash rock which will clear up the deficiency.

—o—

PHOSPHATE ROCK

Q. What does phosphate rock contain?

A. Phosphate rock varies somewhat in its composition dependent upon its source, however, the general constituents are as follows:*

Calcium Phosphate or bone phosphate of lime 65%
(Equivalent P_2O_5—30%)

Phosphate rock contains many other mineral elements, many of which are essential for plant growth:

Calcium Carbonate	Magnesium
Calcium Fluoride	Strontium
Iron Oxide	Barium
Iron Sulphide	Lead
Alumina	Zinc
Silica	Vanadium
Manganese Dixoide	Boron
Titanium Oxide	Nickle
Sodium	Silver
Copper	Iodine
Chromium	

*Ruhm's phosphate rock, a typical example.

—o—

Q. How much phosphate rock shall I apply?

A. About ½ ton to the acre once every three on four years.

NITROGEN

Q. My tomato plants do not appear healthy. The plants are making poor growth and the tips of the leaves at the tops of the plants are very yellowish in color. The stems are hard and are deep purple in color.

A. The symptoms you describe indicate nitrogen deficiency. I would suggest you apply organic matter which consists of leguminous material (clover, alfalfa, etc). If the ground is not needed for planting this year perhaps you should grow a cover crop of legumes. After the crop is well established, apply a liberal covering of manure, raw limestone and finely pulverized phosphate rock. Work the cover crop and other materials added into the surface layer of soil. This practice will increase the nitrogen content, directly through the decomposition of the legume crop and indirectly through rapid increases in the biological activity of the soil organisms, resulting in greater nitrogen fixation from the air.

—o—

CALCIUM

Q. Do plants suffer from calcium deficiency?

A. Yes, calcium deficiency has been found in many places in the United States. The calcium requirements of different species of crop plants vary greatly. The availability of calcium is often influenced by the degree of saturation of the soil colloids, (minute soil particles), clay particles and organic matter, in the soil. Increased amounts of organic matter reduce the danger of calcium deficiency.

If you suspect your soil is deficient in calcium, I would suggest you apply organic matter and liberal quantities of finely ground raw limestone.

—o—

MAGNESIUM

Q. I have heard much lately pertaining to magnesium deficiency. How can I tell if my plants are suffering from this?

A. Soils of the Atlantic and Gulf Coastal Plains, where extensive areas are devoted to vegetable growing, are very low in magnesium content. The causes of the deficiency are a natural lack of magnesium rock material in the soil and extensive leaching due to heavy rainfall.

Tomato plants grown in soil deficient in magnesium develop leaves that are very brittle and have a tendency to curve upwards. The veins remain green while the areas between them become yellow, the yellow color increasing in intensity with distance from the vein. The yellow areas become deeper in color and finely turn brown and break down. The symptoms are most common in the older leaves of mature plants.

Magnesium deficiencies can be corrected by using dolomitic limestone instead of 'regular' limestone.

—o—

COPPER

Q. What can I do if my soil lacks copper.

A. Apply ground phosphate rock and a lot of organic matter.

—o—

ALUMINUM

Q. Our soil has a trace of toxic aluminum. What should be done about it?

A. Aluminum occurs, of course, in most soils. When it is excessive, you want to create in your soil what is scientifically described as "buffer effect" by incorporating organic matter. Spading under a cover crop and applying goodly amounts of compost or, if unavailable, some other source of organic matter, such as Hyperhumus, Peat Moss, etc., and making use of mulches wherever feasible will balance the soil minerals and allow you to raise successful crops.

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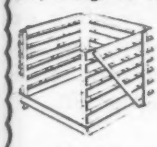

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TRY TRITOMAS

(*Continued from page* 18)

effect. White Fairy is an almost white one, quite small and blooming in June. Vanilla is another June bloomer, pale yellow, long-stemmed, and for me it sends up spikes again in the fall. Goldmine is a deep yellow tinted with gold and amber, blooming in August and on into the fall. The clusters are large, but the plant is not extremely tall. Coral Sea has this same characteristic. It is a deep coral-red, not bright, but very beautiful. It blooms in late July and August. All of these tritomas are hardy with a light mulch where the temperature goes below zero. They are unusual, beautiful, and very useful additions to northern gardens. Try some tritomas and prepare yourself for a pleasant surprise.

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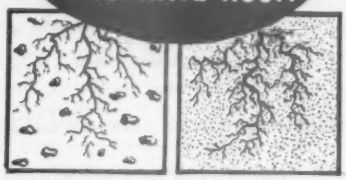

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SEMINAR ON MANURE

(*Continued from page* 24)

of composting bacteria which will break the plant material down in a remarkably short time providing the conditions are kept favorable for the fermentation processes.

It may be well also to include in the compost heap such animal residues as bonemeal, dried blood, dried meat meal, dried fish, and dried manures if available.

FRESH MANURE Vs. COMPOST

Q. I have a quarter ton of goat manure with no hay or straw in it. Should this be used in the heap or directly in the soil?

A. If fresh manure is applied to the soil, sufficient time should be allowed for the manure to undergo decomposition before seeds or seedlings are planted in the soil. When applied directly to the soil it should be turned under lightly with such cover crops as happen to be growing in the soil. Under such conditions the manure and plant materials will be converted into compost in about 60 days. Or the goat manure can be used in the compost heap like any other manure. This method of making compost is called *sheet composting.*

OLD COW MANURE

Q. I have manure that has been in a pile for about three years. Should this be composted or can it be applied to the soil as it is?

A. The manure which has been in a heap for three years should be well composted. Its value as a fertilizer will depend upon such circumstances as size of the heap, amount of rainfall to which it has been exposed, extent to which oxidation has taken place, and the like. This decomposed manure can be applied directly to the soil.

HOG MANURE

Q. Can hog manure be used for making compost, and will it heat like other manures?

A. Hog manure is relatively watery, relatively poor in nitrogen but rich in phosphoric acid. It decomposes slowly, and must be ranked as a *cold manure.* It can be used like other manures in making compost.

BAT GUANO

Q. What is bat guano and can it be used for making compost?

A. Bat guano consists of the droppings, dead bodies, and other residues from bat colonies in regions where there is very little rain, or in caves. It is a rich source of nitrogen. The nitrogen content of bat guano varies from 1 to 10 per cent and the phosphoric acid content may go as high as 25 per cent. When available guano can be substituted for manure.

Dr. William H. Eyster.

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Write today for full information!

ORGANIC PLANT FOOD CO.
P. O. Box 132 **Lancaster, Pa.**

MISCELLANY. . .

(*Continued from page* 27)

as if nothing ever happened. The dentist looked at her teeth and did not see a single cavity, for Nina has been eating organically grown foods ever since she was about 5 years old. Then he said: "No dentist is ever going to make any money out of you," outside of his own case, of course.

NEMATODES

A. D. Shoup, of St. Petersburg, Fla. sent us a clipping from the Dec. 1949 issue of the Florida Grower which I am reproducing herewith:

"Garden soil may be rid of root-knot nematodes by treating it with any of four chemicals that have proved effective for this purpose, according to Dr. W. B. Tisdale, plant pathologist with the Univ. of Florida Agricultural Experiment station.

"The chemicals are Uramon, DD, chloropicrin, and methyl bromide. Uramon may be broadcast over the surface by hand, according to manufacturer's directions, but DD, chloropicrin, and methyl bromide must be applied with a 'gun' that will inject the materials into the soil.

"If DD, chloropicrin, or methyl bromide is used, the soil should be marked off in one-foot squares and one teaspoonful of the material should be injected at each corner of each square. After the material is injected, the soil should be tamped with the foot. Treated soil should be worked a week or so later to enable it to air before planting seed."

Mr. Shoup has found that by merely practicing the organic method he has rid his soil of the root-knot nematodes without employing any of the above mentioned poisons. He not only does not have to spend money for them, but he does not incur the danger of inhaling the poisons while spraying or applying them. In his letter to me he says:

"I have been growing earthworms for the past 18 months and I am now in the process of building two lots of this Florida sand into fertile soil. The only nematode loss I have incurred is when I plant something in the original sandy soil."

J. I. RODALE.

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5 lb. size — $2.00 Prepaid
West of Mississippi $2.50
For approximately 2 tons of compost

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West of the Mississippi $6.00
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Write TODAY for details on how you can increase profits by using **B.C.A.** to . . .

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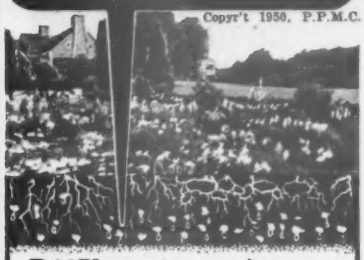

Copyr't 1950, P.P.M.C.

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Fluffy Premier adds *pure, weed-free, spongy, 97% organic matter* to your soil. It gives substance to light soil—loosens heavy soil—so that roots can spread out. Because of its amazing absorbency, it soaks up as much as *20 times its weight in moisture.* It enables all soil to store water, air and plant food—and release it as needed. Premier also acts as an "appetizer" to stimulate the feeding of roots and the growth of plants.

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100 lbs.	Screened Top Soil	1.00
10 lbs.	Raw Bone Meal	1.00
50 lbs.	Raw Bone Meal	3.00
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All packed in washable Plastic bags
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SUNNY RIDGE, 444 New St., Swarthmore, Pa.

Vitamins From Roadside

(*Continued from page* 30)

He has lectured at the New York Botanical Gardens on the lore of the pungent wild harvest.

Here is his recipe for Wild Green Salad:

Rub bowl with garlic. Shred half a head of lettuce, slice two young carrots very thin, add four leaves of escarolle, a few sliced radishes and the fresh chilled leaves of the following wild plants: curly dock, peppergrass, shepherd's purse, dandelion (blanched if possible) and violet. Chop finely the bulbs of any species of wild onion and mix these thoroughly with the leaves. Marinate with a sour-edged dressing, one not too rich to insult the ambrosial green flavors. Garnish bowl with sprigs of chickweed and violet leaves. It may sound like a medicinal formula but no finer salad to serve with a steak dinner!

—o—

Begonias Throughout Year

(*Continued from page* 31)

need plenty of water too. The soil should not be soggy, but the plants need constant moisture. Sprinkling the foliage occasionally helps keep the leaves clean and fresh looking.

With a little care you can have these attractive plants blooming the entire year. Their fresh, sparkling beauty seems never to grow old. No wonder they are called Wax Begonias. Give them the care they need and you just can't keep them from blooming!

J. I. Rodale's
Editorials on Cancer

are available in the back issues of Organic Gardening. Be sure not to miss these eye-opening articles on food, chemicals, and cancer. Issues available: June through January. 25c per copy. May and June cancer editorials available in a single pamphlet for 25c.

ORGANIC GARDENING
Emmaus Penna.

POTTED PLANTS HUNGRY?

House Plants Thrive on ActivO!

Just mix ActivO with potting soil—2 to 4 tablespoons per quart of soil . . . or add to soil of plants already potted and growing. See them pep up! . . . Living organisms, minerals, hormones and vitamins in ActivO energize soil; stimulate growth, make more lush foliage, encourage better blooming and richer color. Tonic for sickly plants.

"NEVER SAW SUCH BLOOMING,"

writes garden authority, who mixed ActivO with potting soil for fuchsias. Try it! By all means use it with AFRICAN VIOLETS.

No. 7 size ActivO gives hundreds of plant feedings.

Coupon and more details on page 4. By all means, TURN NOW TO PAGE 4, and send your order for ActivO while you're thinking of it.

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2- Smother weeds
3- Eliminate need for cultivation

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Ideal for flower beds, gardens, lawns, shrubs. Dark brown color gives rich background, especially for roses. 200 lbs. will cover 260 sq. ft. one inch deep. Convenient 50 lb. bags.

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NO TURNING NEEDED WITH Q. R.

The compost made with Q. R. brought most gratifying results in our garden and we are very enthusiastic about it. (Ohio).

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ORGANIC GARDENING, Emmaus, Pa.

The New Organic Method

(*Continued from page* 37)

much and I look forward to trying out the new ideas.

It occurs to me that we home gardeners have too small a place to have the equipment necessary to do all the processes that are desirable in organic gardening and therefore we should do more cooperatively to offset the situation. I refer particularly to the processing of the enzyme-activator described in your article. Although I have been considering for a long time the purchase of a W.-W. grinder to make the composting materials more digestible in the pile, I still do not know where I can house it inconspiciously on my property which measures 50 ft. by 150 ft. And now comes the question, must I have still another machine to do the grinding of the grain?

After deducting the areas of the house, garage, driveway and walks, I have about 5,000 square feet of earth surface to cultivate and activate which, according to your article, will require about 29 pounds of Enzactivator for one dressing.

I believe the point is that we small gardeners will find it more economical to buy the stuff than to make it. At the cost you mentioned, I believe a commercial producer when assured a sufficient sale of the product can sell it in 100-pound paper bags for $5.00 and make a satisfactory profit.

To start the ball rolling, I offer to buy 100 pounds at about that price up to July 1, 1950.

Who will join me?

J. H. Morgon,
Champaign, Ill.

Regarding the machine to grind the grain for making the Enzactivator, a small hand-operated grain grinder will do the job and can be purchased for a reasonable price. Try Sears, Roebuck or Montgomery Ward. The price is about seven or eight dollars.

In concluding this department this month I wish to express my satisfaction over the fact that the general

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reception of the new idea, the revolution, has been most favorable. But time will tell. With a hundred thousand practitioners, a majority of whom will wade out into the deeper water there ought to be much evidence one way or the other. At any rate our gardening lives should be brightened by this controversy, if it can be called such.

—o—

GARDEN CALENDAR

(*Continued from page* 48)

it is possible to increase the number at practically no cost except a small amount of labor. Select the lowest branch, often only a few inches above the ground, bend it down so that the middle section can be covered with two or three inches of soil, and fasten with a couple of crossed sticks, leaving the tip of the branch out of the ground; cover with mulch. My first attempt surprised me. In a few weeks the branch had rooted, and on removing the branch and transplanting it, there was a rapid growth and not even a wilting of the leaves. Within a few months this had increased to nearly the size of those bought from the nursery.

—o—

An Orchardist's Experience

Dear Mr. Rodale:

During the winter months a farmer catches up with his reading. In this manner, while reading the July issue of *Organic Gardening*, I noticed an invitation for persons operating their orchards organically to register with your publication.

While we are definitely on the road we have only reached the stage of abandoning chemicals completely on about 15 of our 200 apple trees. We have under organic handling, 1 tree for a period of 3 years, 30 trees for a period of 2 years, and 40 trees for a period of one year. For the balance of our orchard we have taken the first step, that is sheet composting.

While we have not followed your instructions to the letter this is not because we think our method is better, but at present it is the nearest we can come to it with the materials we have on hand and still continue to produce a profitable crop. Our compost is composed of cow, sheep and chicken manure with liberal amounts of hay, straw and sawdust used in the bedding and litter to furnish the green matter. These have been applied when either well rotted or half rotted as time would permit. For mulch material we used either sawdust or straw.

During the winter of 1947-1948 a 4 to 6 inch layer of our compost was applied. During the spring of 1948 we added sawdust on top of this till we had a mulch of from 7 to 9 inches. We have added more sawdust on one occasion to maintain this depth. While we carried a regular commercial orchard spray program on all our trees, during 1948, we began to reduce the amount of spray applied to this tree and also reduced the number of sprays it received. During this season, the foliage and fruits of this tree did not materially differ from others of this variety in the orchard.

In 1949 it was given one spray of Elegtol and one of dormant oil before any leaves or blossoms showed forth. From then on no sprays were applied until August. At that time this entire block of Delicious trees became infested with red mites. Along with all the other trees the "Organic Tree" received an application of D. N. 111, since it showed no superior resistance to the mites.

At harvest time checking the produce of this tree with the others it was found that the number of apples it carried was equal to the best production of any tree in the entire block. Several of the other trees matched production in numbers of fruits produced.

However the apples on the "Organic" tree were larger than that of any other tree regardless of the number of fruits within the same variety. We have always heretofore found that the size of the fruit produced was always reduced as the number of fruits produced was increased. The experimental tree disproved that theory. The finish of the fruit and color was unmatched by any other Delicious tree. The foliage

was in better condition and color and terminal growth was tops. On the grading table the "Organic" fruit scored approximately 85-90% clean. It was a revelation to find a total damage of less than 15% from scab and codling moth with not a drop of poison or fungus protectant. Our percentage of clean fruit for the orchard as a whole was, also, about 85-90% in spite of 12 sprays applied. One variety of which we have but ten trees ran as low as 50% clean fruit. There seems little reason for relying on spraying when with three sprays we ran a score 35-40% higher than with twelve sprays. Some day we'll be able to register 100% converted.

Fruitland Farm
Frederick A. Englemann
Commack, N. Y.

—o—

I Don't Believe that....

(*Continued from page* 45)

in excess of that removed by their crops. For instance, on the snapbean crop they added 8 times the amount of potassium removed by the crop and no less than 30 times the amount of phosphorus. Would you not have expected that the beans, with this enormous meal of minerals offered to them, would have so gorged themselves that they would have shown a great increase over the vegetables from the North Central states, most of which had been offered only manure and clover sods? Nothing of the kind happened. Snapbeans from the Eastern states showed 6.38% mineral matter; those from the North Central states, 7.63%. Even with 8 times the amount of potassium they could absorb, the beans from the Eastern states showed 2.12% and those from the North Central states 2.59%. (All figures based on dry weight.) On phosphorus, even though the beans in the Eastern states were offered 30 times what they absorbed, the two areas came out exactly even.

Let us not jump to hasty conclusions, but surely the indications are that plants cannot be stuffed with minerals by the addition of chemicals to the soil, and that if you want vegetables high in mineral content the best way to get them is to grow them on soils that have been fed manure and other organic matter.

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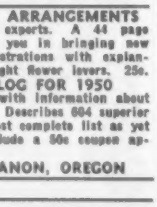

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Turkey Manure

Q. Would you please advise whether turkey manure is suitable for making compost to be put on a truck garden?

Mr. C. K. L., Jr., Phila., Pa.

A. Fresh turkey manure contains 1.31 per cent nitrogen, 0.71 per cent phosphoric acid, and 0.49 per cent potash. Poultry manure, including turkey manure tends to lose nitrogen as it ages. This can be prevented by keeping it moist and composting it with available plant materials. Turkey manure is especially good for making compost for the truck garden.

—o—

Mulch Composting and Diseases

Q. Making compost on the soil directly instead of in pits as formerly poses a question. It has generally been conceded that diseases and insects will flourish on plant life that is left in the soil where it is grown, even though it be disked in. I am referring to the residue of a crop that has been harvested rather than green manure. Isn't the compost pit the only medium whereby you foster the excess growth of desirable bacteria and discourage the growth of those which cause the diseases?

C. W. J., Birdsboro, Pa.

A. Crop residues which are left on the soil after the crop has been harvested should be (1) finely shredded to hasten decomposition, (2) sprayed with a water solution of a compost starter having the desirable organisms, and (3) disking the material into the soil lightly so that decomposition will be complete be-

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fore the new crop is planted. For instance, tomato vines contain the particular chemical elements which are needed for producing new tomato vines. If they are finely shredded and worked into the soil where tomatoes are to be grown the following season, the necessary elements should be readily available. This can be done even though the vines are diseased. The disease-producing organisms in the decomposing residues will encourage the growth of fungi which are antagonistic to them or produce substances which act as antibiotics to the disease-producing fungi.

This does not mean that the same crop should be planted in the same soil year after year. In the case of some plants, as sweet peas, this is a good practice. In many crop plants, however, the roots give off toxic substances which tend to accumulate in the soil, or become infested with a special kind of insect or disease-producing fungus so that a crop rotation is necessary. But the same objection does not seem to hold in shredding the stems and leaves and working them into the soil where a particular kind of plant is to be grown the following season.

—o—

Yew Cuttings

Q. The article by Dr. Eyster in the November issue interested me very much as I have wished to propagate some yews, but without success. When should the cuttings be taken, spring or fall? Should the flats be placed in a greenhouse, in a cold frame, or in open ground heavily mulched during the winter?

Mrs. C. T., Minneapolis, Minn.

A. Yew cuttings should be taken when the new growth is mature in autumn or early spring. If the cuttings are made in autumn, they should be inserted in clean sand making sure that the sand is firmly tamped. The sand must be kept moist by watering as often as necessary. The flats may be kept in the greenhouse, in a cold frame, or outdoors covered with a light mulch during the winter. In the greenhouse the cuttings will be well-rooted by spring, while in the coldframe or outdoors callus will be formed from which the roots will develop when it gets warm in the spring. It takes from 4 to 6 months to root yews, but they are not difficult to root.

—o—

Water Softener and Plants

Q. What chemical is used for water softener? Is it harmful or useful to plants?

W. U., Miami, Florida

A. The most commonly used material for softening water is glauconite, sometimes referred to as 'green sand'. Greensands occur naturally in a finely divided condition, suitable for adding to the soil without grinding. If grinding is necessary, they are soft and easily pulverized. Greensands owe their color to the presence of glauconite. Commercial beds of this material contain approximately 7 per cent of potash, 50 per cent of silica, 18 to 23 percent of iron oxides, 7.5 to 10 per cent of alumina, and 3 to 7.5 per cent of magnesium. From these facts, you will see that this material which is used as a water softener, is not only uninjurious but rather beneficial to the soil in which plants are growing. Glauconite serves as a source of potash and other nutrient elements.

—o—

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making compost I throw several pails of this manure water over each layer of the heap, believing that it hastens decomposition. Do you consider this practice a good one?

C. M. B., Milburn, N. J.

A. The manure water is a culture of the organisms which occur naturally in the manure. Since these organisms are the ones which bring about decomposition, your manure water must be regarded as an excellent compost starter.

—o—

Composts and Yeasts in the Septic Tanks

Q. Is it correct that yeast helps break down the materials in the septic tank? I have used yeast with excellent results. For best results the yeast cake should be dissolved (or rather emulsified in a pint of water). The new dried yeast can also be used.

I have an idea that thoroughly decomposted material, like Frazer compost, would do the same thing, although I have not tested it. A cupful flushed down ought to equal the effect of a cake of yeast.

E. E., Newport, Rhode Island

A. Your experience with yeast in the septic tank is in line with what others have observed. I have no doubt that Frazer compost or any other compost would be beneficial in the septic tank.

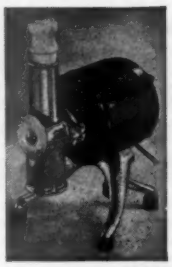
—o—

Mice and Earthworms

Q. Every time I raise the door which is used to cover my earthworm pit, mice scurry out and away. I put a few leaves in the pit, and I have not been able to learn whether the mice are after nesting material or after the earthworms. Can you advise me?

G. D. O., Arlington, Calif.

A. Mice are very fond of earthworms as food, and I suspect the mice in your pit are after the earthworms rather than nesting materials. Mice can be excluded by placing over the top of your pit a piece of close-fitting wire screening. Also your pit enclosure must be mouse-tight. We use wooden boxes lined with galvanized materials having holes too small for earthworms to pass through. Over the top of our culture boxes we keep a close-fitting cover of ½-inch hardware cloth.



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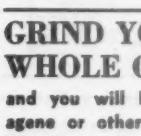

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